YORK®

eco2™

Packaged Rooftop Air-Conditioning Units

(Simplicity Elite with HFC-410a refrigerant)

00873VIP

50 THROUGH 65 TONS

ASHRAE 90.1 COMPLIANT

U.S. GREEN BUILDING COUNCIL MEMBER

MEA 231-02-E

ETL® LISTED

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EPA Energy BUILDINGS ALLY

Introduction

The Eco² packaged rooftop – designed to meet the demands of the market for today and tomorrow.

Better Economy...

Lower total cost of ownership

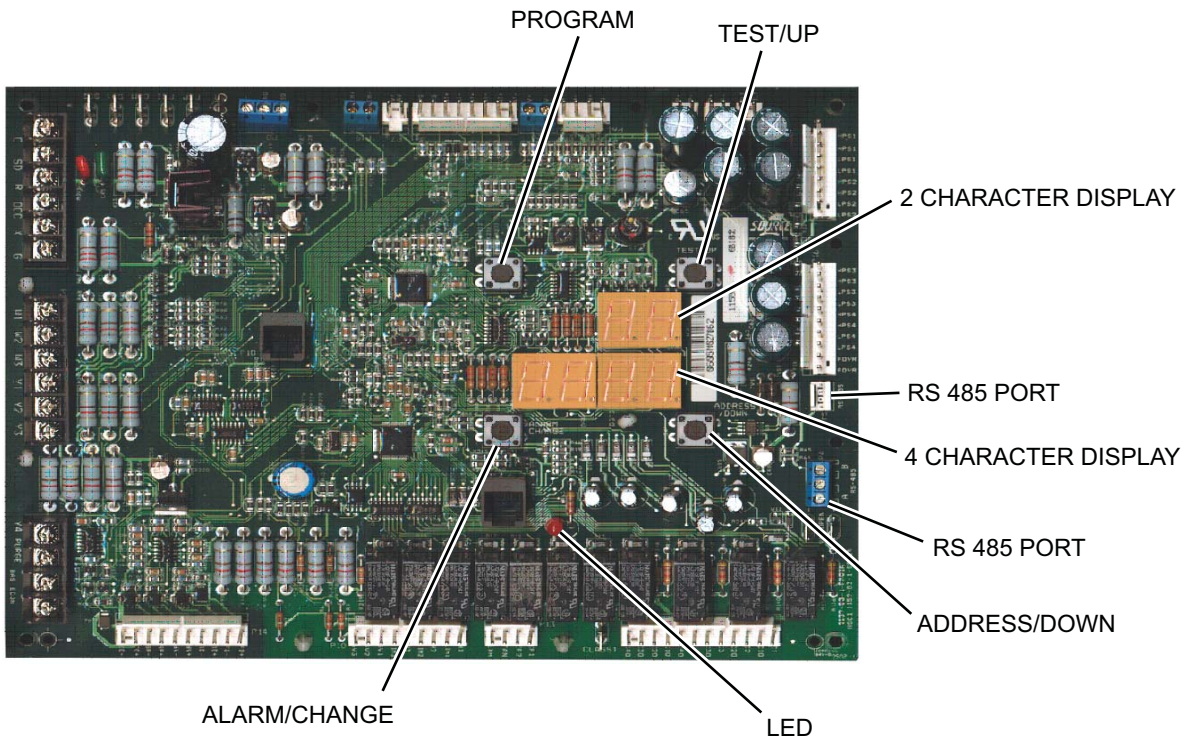
- High efficiency Eco² rooftop units are optimized for HFC-410a refrigerant. YORK provides the FIRST standard product offering that meets the latest ASHRAE 90.1 energy efficiency requirements.
- Accurate ventilation control ensures that no more than the proper amount of ventilation air is utilized. This avoids the energy cost of conditioning excess outside air and simultaneously monitors all other unit functions for maximized energy efficiency.
- Flexible design configurations simplify the design process and allows the Eco² to be applied to virtually any building application.
- Accessibility through double-wall access doors, spacious compartments and supportive floors improves serviceability.
- Note that modulating heat is not offered with Elite controller option.

Simplicity Elite controller Option

Better Ecology...

Indoor air quality features for the indoor environment

- Double-wall construction of the roof, floor, doors, and walls prevents insulation fibers from entering the conditioned air. The inner liner also facilitates periodic cleaning of the unit to prevent harmful build-up of bacteria or contaminants.
- The rooftop unit control center uses microprocessor logic to analyze and optimize ventilation decisions and perform demand ventilation, and allow airflow compensation to maintain the air quality at a healthy level.



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Features and Benefits

AIRFLOW CONFIGURATIONS

Variable-Air-Volume – Eco^2 units are available for single-zone variable-air-volume (VAV) applications. Supply fans are controlled to the supply duct static pressure setpoint, which can be reset via a BAS, or through an analog voltage input on the unit controller for optimized duct static pressure control. The static pressure transducer is provided in the rooftop unit, and 5/16" or 1/4" plastic tubing and static pressure sensor must be supplied by others and installed approximately 3/4 down the longest duct run.

Constant Volume – Eco^2 units are available for single-zone constant volume applications. Control can be used with a zone sensor, thermostat, or building automation system.

COOLING AND HEATING CONFIGURATIONS

Cooling Only – For applications where no heat is required, or heating is provided elsewhere within the building HVAC system, cooling only units include an empty discharge plenum. Supply duct connections are configurable for bottom, left or right discharge. The supply air temperature sensor is included and factory-installed.

Staged Gas Heat – For applications requiring gas heat for morning warm-up, or other heating needs, a staged natural gas furnace is available. The furnace is located in the discharge plenum, downstream of the supply fan. The supply air temperature sensor is located across the face of the supply duct opening in the unit. Furnaces are designed in 375 mbh modules with one stage each. Three are available on the YPAL050-061 with bottom discharge and two are available on the YPAL050-061 with left-side discharge. Ignition and safety controls are included and factory-wired.

POWER OPTIONS

Single-point supply with terminal block – This configuration is standard, and includes three terminals for the incoming 3-phase power and is the standard configuration for the Eco^2 product. It includes the enclosure, terminal-block, and interconnecting wiring to the compressors, heater and furnace controls, all fans, etc. In this configuration, code requires that a means of disconnect (not provided) must be installed at the site within line-of-sight of the equipment.

Single-point supply with non-fused disconnect switch – This option is the same the single-point with terminal block option except it includes a unit-mounted through-the-door manual non-fused disconnect switch with an external, lockable handle (in compliance with Article 440-14 of N.E.C.). This option provides a means to isolate the unit power voltage for servicing. Others must supply separate external fusing which must comply with the National Electric Code and/or local codes.

Dual-point supply with terminal block – This option includes enclosure, terminal blocks circuited to the supply and exhaust fans and control transformer and a second set of terminal blocks with interconnecting wiring to the compressors, heat (if applicable) and condenser.

Convenience Outlet – This options includes a powered 115V GFCI convenience outlet that can be used for powering tools or lights for servicing. A protective cover plate is included while not in use. The outlet is located on the bottom left hand corner of the power panel.

CONTROL FEATURES AND OPTIONS

Simplicity Elite Unit Controller – All Eco^2 units are equipped with a factory-installed, programmed and commissioned unit controller with all I/O capabilities and control sequences. The controls include all on-board diagnostic, safety and control features to operate the rooftop unit. Two RS485 communication ports are included as standard with one alarm output, a shutdown contact, smoke ventilation contact, analog inputs for supply air temperature and duct static pressure reset, along with a variety of other capabilities.

Standard Ambient – YPAL050-061 models operate down to 40°F as standard.

Low Ambient – This option includes low ambient control of the first refrigerant circuit down to 0°F through the use of suction and discharge pressure transducer on circuit one, and condenser fan speed using a variable-frequency drive on the first condenser fan of circuit one. Mechanical cooling with circuit two is locked out below 45°F (adjustable).

Flexsys bypass control option is not available with elite controller.

SENSOR AND THERMOSTAT AND SENSOR OPTIONS

Wall-Mount Zone Sensor – A thermistor zone sensor for wall mounting. This zone sensor is for sensing temperature only, and does not include any setpoint adjustment features.

7-Wire Thermostat – This option is for a ship-loose thermostat to interface with the Eco^2 unit. All models, YPAL050-061, include an interface for a 7-wire thermostat as standard.

COMMUNICATIONS

BACnet MSTP (RS-485) Communications – This communication is available via optional Modlinc Gateway. Communications to the unit are through a twisted pair, and the wire terminations are on the primary unit control board.

Modbus RTU Communications – This communication is standard on every Eco^2 unit and can be used in lieu of the BACnet communications (only one can be used at a time).

FILTER OPTIONS

Filter Options – Two-inch 30% throwaway, cleanable, carbon or pleated filters in an angled rack are available. For higher filtration requirements, optional rigid filter racks are available with twelve-inch 65% or 95% efficient rigid filters. Two-inch pre-filters are included with rigid filter options. The rigid filter rack option is available without filter media where field-supplied filters are required.

OUTSIDE AIR DAMPER OPTIONS

Manual Damper – This option includes a manually adjustable outside air damper. It is manually adjustable at the unit by setting a mechanical stop between 0-100 percent.

Two-Position – This outside air damper option is controlled to a two positions, opened and closed. Determination of the damper position is based on the occupancy schedule. In the occupied mode, the outside air damper is positioned to the manually configured point (set by mechanical stop). In the unoccupied mode, the damper is fully closed.

Modulating Economizer – This option includes modulating outdoor air and return air dampers that are interlocked and positioned by fully modulating, solid state damper actuators. Control of the damper is via a standard ambient outdoor air dry bulb sensor, or optional single or comparative enthalpy controls.

Rain Hoods on Outside Air Intakes – For all options with outside air intake openings, rain hoods are provided as standard to keep moisture from entering the equipment. Rain hoods as an integral part of the unit and are rotated into place.

RELIEF SYSTEM

Barometric Relief – Optional building air exhaust shall be accomplished through barometric relief dampers installed in the return air plenum. The dampers will open relative to the building pressure. The opening pressure shall be adjustable via a spring tension adjustment.

Modulating Powered Exhaust with Damper Control– This option consists of a constant-speed exhaust fan with a discharge damper that is modulated to control the flow of exhaust air. The damper control logic is based on the building static pressure setpoint within the rooftop unit controller. The static pressure transducer is provided in the return plenum of the rooftop unit, and 5/16” or 1/4” plastic tubing and static pressure sensor must be supplied by others and installed in a representative location in the building.

Modulating Powered Exhaust with a VFD – This option consists of a VFD to modulate the speed of the exhaust fan to control the flow of exhaust air. The VFD control logic is based on the building static pressure setpoint within the rooftop unit controller. The static pressure transducer is provided in the return plenum of the rooftop unit, and 5/16” or 1/4” plastic tubing and static pressure sensor must be supplied by others and installed in a representative location in the building.

SUPPLY FAN OPTIONS

DWDI Forward-Curved Supply Fan – The standard supply air blower is a forward-curved supply fan. This fan is good for medium static pressures and high airflows.

DWDI Airfoil Supply Fan – An optional airfoil blade supply fan is available on all models for higher static conditions. This option offers higher efficiency and lower sound in certain applications.

Fan Skid Isolation – The entire supply fan assembly is isolated from the unit base with one (standard) or two-inch deflection springs with optional seismic restraints.

Supply and Exhaust Fan Motors – High efficiency ODP, and standard and high efficiency TEFC motors are available all meeting the Energy Policy Act of 1992 (EPACT).

Supply Fan VFD and Manual Bypass – For VAV applications, VFDs are provided to modulate air flow. Optional manual bypass can also be provided to allow full airflow in the event of a VFD failure.

Features and Benefits *(continued)*

EVAPORATOR SECTION

Double Wall Construction – Double-wall construction is the standard construction of the Eco² and incorporates powder coated pre-fabricated outer panels and corner post for maximum exterior surface protection.

Factory Shrink-wrap – Eco² rooftop units are shipped from the factory with factory-fresh shrink-wrap packaging. No longer does the contractor need to worry about dirt and debris clogging up condenser coils or moisture leaking into the air handler on the units way to the job site or rigging yard.

Copper Fins – For more extreme climates that aggressively can attack aluminum, copper tube evaporator coils with copper fins are available. (This is not recommended for units in areas where they may be exposed to acid rain or environments where ammonia is present)

CONDENSER FEATURES AND OPTIONS

Scroll Compressors – Reliable, efficient, trouble-free operation is the true measure of a packaged rooftop's value. That's why YORK Eco² Packaged Rooftop Air Conditioners use established scroll compressor technology to deliver dependable, economical performance in a wide range of applications. With the Eco² Packaged Rooftop, you get the latest generation of compressor enhancements added to the scroll's inherent strengths. The simplicity of a hermetic scroll compressor allows the use of fewer moving parts to minimize breakdown.

Multiple Compressor Staging – Through the use of the scroll compressor, the Eco² has the ability to stage its cooling by enabling and disabling multiple single stage compressors on multiple circuits. These compressors are manifolded together in pairs on a single refrigeration circuit.

Compressor Circuiting – the Eco² is designed so that only 2 scroll compressors are in tandem within one refrigeration circuit. This means more reliable compressors, and less equipment down time. With multiple circuits, if a compressor should ever fail on one circuit, the other circuit will remain operational to work to maintain occupied loads. The Eco² system has 2 circuits in a unit.

Condenser Fan Motors – The condenser fan motors used on the Eco² unit are Totally Enclosed Air Over (TEAO) to provide maximum durability through any season.

Hot Gas Bypass – This options permits continuous, stable operation at capacities below the minimum step of unloading by introducing an artificial load on the evaporator. For models YPAL050-061, it is used on the lead circuit and standard on VAV units.

Replaceable Core Liquid Line Driers – Liquid line driers are standard on the Eco² rooftop unit. An option is provided for replaceable core driers.

Copper Fins – For more extreme climates that aggressively can attack aluminum, copper tube condenser coils with copper fins are available. (This is not recommended for units in areas where they may be exposed to acid rain or environments where ammonia is present)

Pre-Coated Fins – An epoxy-coated aluminum fin stock to guard from corrosive agents and insulate against galvanic potential. Recommended for mild seashore or industrial locations.

Post-Coated Fins – Technicoat coil-coating process used on condenser coils for seashore and other corrosive applications (with the exception of strong alkalis, oxidizers, wet bromide, chlorine and fluorine in concentrations greater than 100ppm).

Compressor Sound Blankets – Optional compressor acoustic sound blankets are available for sound sensitive applications.

ROOF CURBS

Partial perimeter roof curbs – This option includes a knock-down 14" high roof curb for use with wood nailer (by others). Roof curb supports the air handling section with a separate support under the condenser end.

CABINET FEATURES AND OPTIONS

Double-Wall Access Doors - Full-sized access doors provide easy access into the unit for routine maintenance and inspection. Solid wall liners encase insulation and prevent damage and erosion into the airstream.

Industry-leading, 1,000-hour, salt-spray rating, per ASTM B117, keeps unit in superior condition.

ACCESSORIES

Filter Switch – An optional dirty filter alarm can be provided that will provide an alarm when the filters require cleaning.

Magnahelic Filter Pressure Gauge – On units equipped with downstream filtration, a magnahelic filter gauge is included and visible on the exterior of the unit. The filter gauge measures the air pressure drop for through the rigid filter bank to indicate when replacement is required.

Application Data

GENERAL

The Eco² air conditioning units are designed for outdoor installation. When selecting a site for installation, be guided by the following conditions:

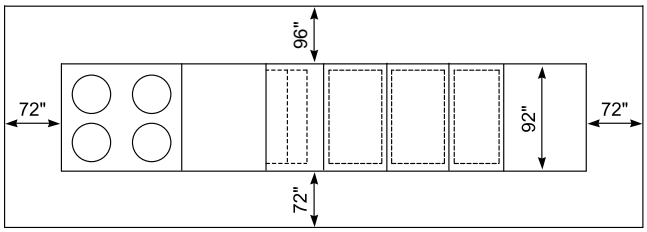
- Unit must be installed on a level surface.
- For the outdoor location of the unit, select a place having a minimum sun exposure and an adequate supply of fresh air for the condenser.
- Also avoid locations beneath windows or between structures.
- Optional condenser coil protection should be used for seashore locations or other harsh environments.
- The unit should be installed on a roof that is structurally strong enough to support the weight of the unit with a minimum of deflection. It is recommended that the unit(s) be installed not more than 15 feet from a main support beam to provide proper structural support and to minimize the transmission of sound and vibration. Ideally, the center of gravity should be located over a structural support or building column.
- Location of unit(s) should also be away from building flue stacks or exhaust ventilators to prevent possible reintroduction of contaminated air through the outside air intakes.
- Be sure the supporting structures will not obstruct the duct, gas or wiring connections.
- Proper service clearance space of 6-feet around the perimeter of the unit, 8-feet on one side for coil servicing, and 12-feet to any adjacent units is required to eliminate cross contamination of exhaust and outdoor air, and for maintenance tasks such as coil pull and cleaning. No obstructions should be above the condensing unit section.

LOCATION

Of the many factors that can effect the location of equipment, some of the most important to consider are Structural, Acoustical and Service clearances. Proper attention should be made at the design stage to ensure proper structural support. In cases where equipment is being replaced, be aware of building design to insure support is adequate for the application.

The next most important consideration in applying roof top equipment is that of sound from the equipment. Special care should be made to keep the roof top unit away from sound sensitive areas such as conference rooms, auditoriums and executive offices and any other room that may have potential for tenant occupancy. Possible locations could be above hallways, mechanical or utility rooms.

Finally, service clearances should be maintained in rooftop design to insure safe access to the unit. Unit clearances are designed so that technicians have enough space between units, building walls, and edges of building to gain access safely. In cases where space is limited, please call your local YORK representative for additional information.



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NOTE:
1. Under certain conditions these clearances may be encroached upon.
2. This is a visual reference for all Eco² units.

RIGGING

Proper rigging and handling of the equipment is mandatory during unloading and setting it into position to retain warranty status.

Spreader bars must be used by cranes to prevent damage to the unit casing. All lifting lugs must be used when lifting the rooftop unit. Fork lifts will damage the rooftop unit and are not recommended. Care must be taken to keep the unit in the upright position during rigging and to prevent damage to the watertight seams in the unit casing. Avoid unnecessary jarring or rough handling.

UNIT PLACEMENT

- **Elevated** – Elevated roof curbs or dunnage steel can be used to support the unit in order to raise it to specific heights. When this type of placement is required, be sure to keep unit access in mind. Cat-walks or other forms of unit access may be required to one or both sides of the unit, depending on your area of the country and the local codes that are enforced. Please check with local officials to ensure the application conforms to local codes and regulations.
- **Ground Level Locations** – It is important that the units be installed on a substantial base that will not settle, causing strain on the refrigerant lines and sheet metal and resulting in possible leaks. A one-piece concrete slab with footers extended below the frost line is highly recommended. Additionally, the slab should be isolated from the main building foundation to prevent noise and vibration transmission to the building structure. For ground level installations, precautions should be taken to protect the unit from tampering by, or injury to, unauthorized

persons. Erecting a fence around the unit is common practice.

- **Roof curb** – YORK offers optional roof curbs designed specifically for the Eco² footprint. This curb comes as an open condenser model and is shipped disassembled and requires field assembly and installation. For bottom supply and return openings, the curbs have matching connections to ease installation. A pipe chase that matches the rooftop unit pipe chase is also included in the curb footprint for through-the-curb utility connections. The curb should be located according to the location recommendations above, and properly sealed to prevent moisture and air leakage into and out of the duct system. Flexible collars should be used when connecting the duct work to prevent unit noise transmission and vibration into the building.

Duct work should be supported independently of the unit.

TABLE 1 – SUPPLY-AIR DUCT-CONNECTION CONFIGURATIONS

Unit Configuration		Supply Air		
		Bottom	Left	Right
50-65 Tons	Cooling only	✓	✓	✓
	Cool/gas heat 375-750 MBH	✓	✓	N/A
	Cool/gas heat 1,125 MBH	✓	N/A	N/A

TABLE 2 – RETURN-AIR DUCT-CONNECTION CONFIGURATIONS

Unit Configuration		Return Air		
		Bottom	Left	Rear
50-65 Tons	No exhaust	✓	✓	✓
	Barometric relief damper	✓	✓	N/A
	Powered exhaust fan	✓	✓	N/A

DUCT CONSIDERATIONS

Unlike competitive units where air can leave the rooftop unit stratified across the width of the unit, the Eco² unit sufficiently mixes airflow to ensure consistent air temperature from the unit. No special Tee considerations are required and the unit may be oriented either way.

UNIT ORIENTATION

For applications with multiple rooftop units located in close proximity on the roof, the orientation of the unit may be important to reduce the potential for re-entrainment of outside airflow. Regardless of the outside air and exhaust air openings on a unit, all rooftop applications can permit recirculation of exhaust air to the return, if applied improperly.

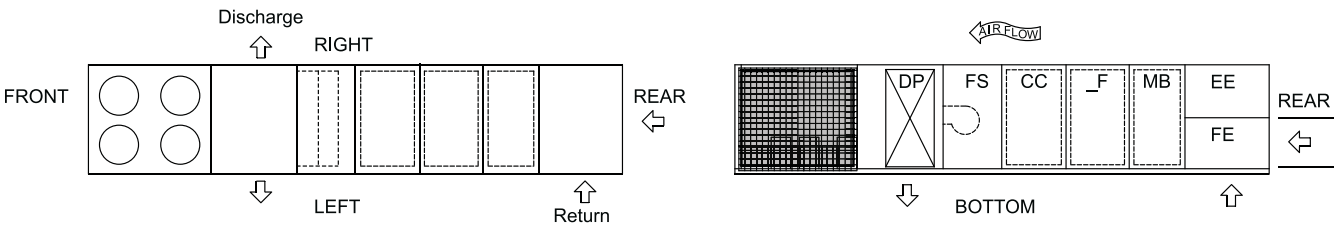
HORIZONTAL APPLICATIONS

The spectrum of applications for roof top units in today's market is continuing to grow wider by the day. Flexibility in unit design and construction is a must in today's market in order to insure safe and sound applications of HVAC equipment. The Eco² has been designed for specific application of horizontal supply and return airflow taking the guess work out of unit application by building a unit specific to these needs. If the application calls for horizontal supply and return air, YORK can ship it from the factory as a horizontal unit. This option elevates the need for field modification of equipment, saving time and money. The Eco² can support a left discharge on all units except 1,125 MBH gas, and/or right discharge on all cooling-only units. Return air can be brought through the end or side return air inlet making the unit specific to building needs.

ECONOMIZER

The economizer section is used for ventilation of the conditioned space to maintain indoor air quality, and also to reduce energy consumption by using outdoor air cooling in lieu of mechanical cooling. If outdoor air is appropriate for cooling, but not sufficient for the cooling demand, mechanical cooling will stage on as necessary until the cooling load is met.

Dual (comparative or differential) enthalpy operation is the most accurate and efficient means of economizer operation. The unit controller monitors the return and outside air energy content, and selects the lower of the two for operation.



NOTE:
This diagram is provided as a visual reference of the Eco² discharge & return air openings & locations for all sizes. Please refer to the dimensional data for exact size & location of panels and openings.

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Application Data *(continued)*

VAV SUPPLY AIR PRESSURE CONTROL

Traditional packaged rooftop systems use inlet guide vanes (IGVs) for duct static pressure control. These control supply duct pressure by modulating dampers (introducing losses and inefficiencies) on the inlet of the fan, open and closed. YORK's variable frequency drives (VFDs) offer superior fan speed control and quieter, energy efficient operation.

For VAV applications, the YORK Eco^2 unit uses a VFD to modulate fan speed and maintain a constant duct static pressure. VFDs offer superior control over the operation of the unit at part load, and offer the additional benefits of quieter and more efficient operation when compared to IGV.

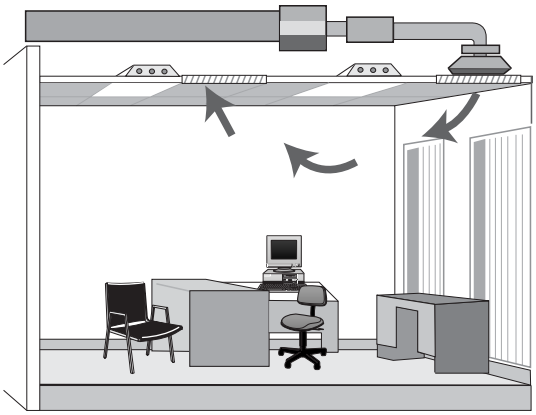

FIG. 1. TRADITIONAL OVERHEAD VAV AIR DELIVERY SYSTEM

HARSH ENVIRONMENTS – CONDENSER AND EVAPORATOR COIL PROTECTION

For harsh environmental conditions such as seashore applications, YORK offers three types of coil protection: copper fin material, black fin and Technicoat coatings. YORK recommends that for corrosive environments that copper fins be used to protect the evaporator and/or condenser coils. In areas where chemicals that can corrode copper are present, such as ammonia, YORK recommends that the black fin or Technicoat coating be used for maximum protection.

- **Copper-Fin Evaporator and Condenser Coil** – Copper fins can be used instead of aluminum for additional corrosion protection. However, it is not suitable for areas that are subject to acid rain or exposed to ammonia.
- **Pre-Coated Condenser Fins** – Black fin coating (yellow fin for evaporator fins) is pre-coated application epoxy on aluminum fin stock to guard from corrosive agents and insulate against galvanic potential. It is used for mild seashore or industrial locations. This can provide corrosion resistance comparable to copper fin coils in typical seashore locations.
- **Post-Coated Condenser Fins** – Technicoat (a post-coated application of epoxy) can be used for seashore and other corrosive applications with the exception of strong alkaloides, oxidizers, wet bromide, chlorine and fluorine in concentrations greater than 100 ppm. Any of the above suitable options should be selected based on the particular project design parameters and related environmental factors. The application should be further reviewed and approved by the consulting engineer or owner based on their knowledge of the job site conditions.

BUILDING PRESSURE CONTROL SYSTEMS

Building pressure control systems are often necessary when economizers are used to bring in outdoor air. Without proper building exhaust, the building may become over pressurized. The pressure control system maintains the proper building pressure by expelling the appropriate amount of air from the building.

Exhaust/relief fans – In this application, a powered exhaust fan may be suitable, however careful consideration of the fan type is necessary. YORK offers a centrifugal powered exhaust fan to perform this function. Some manufacturers use a propeller exhaust fan, which cannot handle the static pressure requirements.

For systems with moderate to low return static pressure, an exhaust fan is recommended. The benefit of the exhaust fan is that it does not run all of the time, and may facilitate compliance with the ASHRAE 90.1 fan motor horsepower requirement.

The exhaust fan operates in parallel with the supply fan. In this arrangement, the supply fan handles the full static pressure requirements of the system. For normal building pressure control, the exhaust fan operates to draw air from the return plenum and exhaust it out of the building.

The exhaust fan configuration is available in two forms, modulating and non-modulating. Modulating is the most common and recommended for the majority of applications, while non-modulating should be used with in only certain circumstances.

In the modulating exhaust system, the volume of airflow exhausted from the building is proportional to the entering volume of outside air. Control is accomplished via either a discharge damper or a variable-frequencydrive (VFD). YORK recommends the use of a VFD to reduce energy consumption, sound levels and improved reliability due to fewer moving parts.

In the non-modulating exhaust system, the exhaust airflow is constant whenever the exhaust fan is operating. This type of control should only be used to either assist a smoke purge system or when a system requires a constant volume of exhaust airflow.

ACOUSTICAL CONSIDERATIONS

The Eco^2 unit is designed for lower sound levels than competitive units by using flexible fan connections, fan spring isolators, double-wall construction, multiple fan options, and lower speed and horsepower fans. For VAV applications, VFDs are used instead of inlet guide vanes. Additional sound attenuation can be obtained using compressor sound blankets and field-supplied sound attenuators when necessary.

Even with these equipment design features, the acoustical characteristics of the entire installation must never be overlooked. Additional steps for the acoustical characteristics of a rooftop installation should be addressed during the design phase of a project to avoid costly alterations after the installation of the equipment. During the design phase of a project, the designing engineer should consider, at a minimum, the impact of the equipment location, rooftop installation, building structure, and duct work.

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Nomenclature

1 Base	2 Product	3	4 Type		5	6	7 Nominal Capacity		8 Application	9	10 Refrigerant		12 Voltage		13 Supply Openings	14 Return Opening	15 Design	16 Special	
Y	P	A	:YORK		0	5	0	:50 Ton Capacity	C	:Cooling Only	B	:R-407C	5	:208/3/60	B:Bottom Return	B:Bottom Return	F	X	:Standard Product, IPU
			:Packaged Rooftop		0	5	1	:55 Ton Capacity	N	:Staged Natural Gas Heat	C	:R-22	5	:230/3/60	L:Left Supply	R:Rear Return		S	:Special Product, IPU
			:Air Cooled		0	6	0	:60 Ton Capacity	G	:Staged Natural Gas Heat, S/S HX	E	:R-410A	6	:460/3/60	R-Right Supply	S:Side Return		A	:Standard Product, Simplicity Elite
			L	:Scroll	0	6	1	:65 Ton Capacity	M	:Full Modulating Gas Heat			8	:575/3/60		L:Left Return		B	:Special Product, Simplicity Elite
									F	:Full Modulating Gas Heat, S/S HX	C	:Constant Volume							
									E	:Electric Heat	V	:VAV, VFD							
									H	:Hot Water Heat	F	:Flexsys							
									S	:Steam Heat									

Physical Data

TABLE 3 – PHYSICAL DATA

MODEL	050	051	060	061
General Data				
Length without hood (inches)	339	339	339	339
Width (inches)	92	92	92	92
Height (inches)	82	82	82	82
Compressor Data				
Quantity	4	4	4	4
Type	Scroll	Scroll	Scroll	Scroll
Unit Capacity Steps	4	4	4	4
R410a Charge (SYS 1/2) (lb-oz)	50 / 50	50 / 50	58 - 11 / 58 - 11	58 - 11 / 58 - 11
Supply Fan				
Quantity	1	1	1	1
Type	FC	FC	FC	FC
Size	28 - 28	28 - 28	28 - 28	28 - 28
Motor Size Range (HP)	10 - 40	10 - 40	10 - 40	10 - 40
Air Flow Range (CFM)	10,000 - 22,500	10,000 -22,500	12,500 - 24,000	12,500 - 24,000
Static Pressure Range (Total)	1.0" - 6.0"	1.0" - 6.0"	1.0" - 6.0"	1.0" - 6.0"
Optional Supply Fan				
Quantity	1	1	1	1
Type	AF	AF	AF	AF
Size	28	28	28	28
Motor Size Range (HP)	10 - 40	10 - 40	10 - 40	10 - 40
Air Flow Range (CFM)	10,000 - 24,000	10,000 - 24,000	12,500 - 24,000	12,500 - 24,000
Static Pressure Range (Total)	1.0" - 8.0"	1.0" - 8.0"	1.0" - 8.0"	1.0" - 8.0"
Exhaust Fan				
Quantity Fans/Motors	2 / 1	2 / 1	2 / 1	2 / 1
Type	FC	FC	FC	FC
Size	18 - 18	18 - 18	18 - 18	18 - 18
Motor Size Range (HP)	5 - 20	5 - 20	5 - 20	5 - 20
Air Flow Range (CFM)	4,000 - 22,500	4,000 - 22,500	4,000 - 24,000	4,000 - 24,000
Static Pressure Range (Total)	0.1" - 1.5"	0.1" - 1.5"	0.1" - 1.5"	0.1" - 1.5"
Evaporator Coil				
Size (square feet)	52	52	52	52
Rows/FPI	3 / 17	3 / 17	4 / 17	4 / 17
Condenser Coil				
Size (square feet)	88	88	88	88
Rows/FPI	2 / 17	2 / 17	3 / 17	3 / 17
Condenser Fans				
Quantity	4	4	4	4
Type	Prop.	Prop.	Prop.	Prop.
Diameter (inches)	36	36	36	36
Motor HP	2	2	2	2
Filters - 2" throwaway (pre-filter position - angled)				
Quantity	8 / 12	8 / 12	8 / 12	8 / 12
Size (length x width) (in.)	25x16 / 25x20	25x16 / 25x20	25x16 / 25x20	25x16 / 25x20
Total Filter Face Area (square feet)	61.6	61.6	61.6	61.6
Filters - 2" cleanable (pre-filter position - angled)				
Quantity	8 / 12	8 / 12	8 / 12	8 / 12
Size (length x width) (in.)	25x16 / 25x20	25x16 / 25x20	25x16 / 25x20	25x16 / 25x20
Total Filter Face Area (square feet)	63.9	63.9	63.9	63.9
Filters - 2" pleated, 30% efficient (pre-filter position - angled)				
Quantity	8 / 12	8 / 12	8 / 12	8 / 12
Size (length x width) (in.)	25x16 / 25x20	25x16 / 25x20	25x16 / 25x20	25x16 / 25x20
Total Filter Face Area (square feet)	63.9	63.9	63.9	63.9

TABLE 3 – PHYSICAL DATA (cont'd)

MODEL	050	051	060	061
Filters - 12" rigid 65%, 2" 30% prefilter (pre-filter position)				
Quantity	1 / 4 / 9	1 / 4 / 9	1 / 4 / 9	1 / 4 / 9
Size (length x width) (in.)	16x20/25x16/25x20	16x20/25x16/25x20	16x20/25x16/25x20	16x20/25x16/25x20
Total Filter Face Area (square feet)	43.0	43.0	43.0	43.0
Filters - 12" rigid 95%, 2" 30% prefilter (pre-filter position)				
Quantity	1 / 4 / 9	1 / 4 / 9	1 / 4 / 9	1 / 4 / 9
Size (length x width) (in.)	16x20/25x16/25x20	16x20/25x16/25x20	16x20/25x16/25x20	16x20/25x16/25x20
Total Filter Face Area (square feet)	44.6	44.6	44.6	44.6
Filters - 2" carbon (pre-filter position - angled)				
Quantity	8 / 12	8 / 12	8 / 12	8 / 12
16x20/25x16/25x20	25x16/25x20	25x16/25x20	25x16/25x20	25x16/25x20
Total Filter Face Area (square feet)	63.9	63.9	63.9	63.9
Filters - 12" rigid rack only, with 2" throwaways				
Quantity	1 / 4 / 9	1 / 4 / 9	1 / 4 / 9	1 / 4 / 9
Size (length x width) (in.)	16x20/25x16/25x20	16x20/25x16/25x20	16x20/25x16/25x20	16x20/25x16/25x20
Total Filter Face Area (square feet)	43	43	43	43

MODEL		050	051	060	061
Gas Furnaces					
Staged Furnace Sizes (input/output/steps)		375 MBH / 300 MBH / 1 steps			
		750 MBH / 600 MBH / 2 steps			
		1125 MBH / 900 MBH / 3 steps			
Gas Pressure Range		4.5" - 13.5" IWC	4.5" - 13.5" IWC	4.5" - 13.5" IWC	4.5" - 13.5" IWC
Minimum OA Temp for Mech. Cig.		40°F	40°F	40°F	40°F
Low Ambient Option Min. OA Temp		0	0	0	0
Minimum Airflow (Heating)	375	7,500	7,500	11,500	11,500
	750	14,000	14,000	14,000	14,000
Bottom Supply Only	1,125	21,000	21,000	21,000	21,000

Physical Data

TABLE 4 – EFFICIENCY RATINGS

Model	IPLV	CV IEER	VAV IEER
YPAL050	10.9	11.3	13.5
YPAL051	10.6	11.2	13.1
YPAL060	10.4	11.0	13.4
YPAL061	10.3	10.8	13.2

TABLE 5 – PHYSICAL DATA – UNIT EER

Model	Supply Blower Type	EER	
		Cooling Only	Gas Heat
YPAL050	Forward-Curved	10.3	10.0
	Air Foil	10.3	10.1
YPAL051	Forward-Curved	10.2	9.9
	Air Foil	10.2	10.0
YPAL060	Forward-Curved	10.1	9.8
	Air Foil	10.1	9.9
YPAL061	Forward-Curved	10.1	9.8
	Air Foil	10.1	9.9

TABLE 6 – PHYSICAL DATA - COMPRESSORS

		Compressors Utilized				Compressor Nominal Tons				% Capacity Per Stage			
		System 1		System 2		System 1		System 2					
		“Compr # 1”	“Compr # 2”	“Compr # 3”	“Compr # 4”	“Compr # 1”	“Compr # 2”	“Compr # 3”	“Compr # 4”	“Stage 1”	“Stage 2”	“Stage 3”	“Stage 4”
Model	050	ZP137	ZP120	ZP137	ZP120	13.58	12.53	13.58	12.53	26.0	52.0	76.0	100.0
	051	ZP137	ZP137	ZP137	ZP137	13.58	13.58	13.58	13.58	25.0	50.0	75.0	100.0
	060	ZP182	ZP137	ZP182	ZP137	17.95	13.30	17.95	13.30	28.7	57.4	78.7	100.0
	061	ZP182	ZP137	ZP182	ZP154	17.95	13.30	17.60	14.86	28.2	55.8	76.7	100.0

Altitude and Temperature Corrections

The information below should be used to assist in application of product when being applied at altitudes at or exceeding 1000 feet above sea level.

The airflow rates listed in the standard blower performance tables are based on standard air at sea level. As the altitude or temperature increases, the density of air decreases. In order to use the indoor blower tables for high-altitude applications, certain corrections are necessary.

A centrifugal fan is a “constant-volume” device. This means that if the RPM remains constant, the CFM delivered is the same regardless of the density of the air. However, since the air at high altitude is less dense, less static pressure will be generated and less power will be required than a similar application at sea level. Air-density-correction factors are shown in Table 7 and Figure 2.

TABLE 7 – ALTITUDE-CORRECTION FACTORS

Air Temp	Altitude (feet)										
	0	**1000**	**2000**	**3000**	**4000**	**5000**	**6000**	**7000**	**8000**	**9000**	**10000**
40	1.060	1.022	0.986	0.95	0.916	0.882	0.849	0.818	0.788	0.758	0.729
50	1.039	1.002	0.966	0.931	0.898	0.864	0.832	0.802	0.772	0.743	0.715
60	1.019	0.982	0.948	0.913	0.880	0.848	0.816	0.787	0.757	0.729	0.701
70	1.000	0.964	0.930	0.896	0.864	0.832	0.801	0.772	0.743	0.715	0.688
80	0.982	0.947	0.913	0.880	0.848	0.817	0.787	0.758	0.73	0.702	0.676
90	0.964	0.929	0.897	0.864	0.833	0.802	0.772	0.744	0.716	0.689	0.663
100	0.946	0.912	0.88	0.848	0.817	0.787	0.758	0.730	0.703	0.676	0.651

The examples below will assist in determining the airflow performance of the product at altitude.

Example 1: What are the corrected CFM, static pressure, and BHP at an elevation of 5,000 ft. if the blower performance data is 6,000 CFM, 1.5 IWC and 4.0 BHP?

Solution: At an elevation of 5,000 ft, the indoor blower will still deliver 6,000 CFM if the RPM is unchanged. However, Table 7 must be used to determine the static pressure and BHP.

Since no temperature data is given, we will assume an air temperature of 70°F. Table 7 shows the correction factor to be 0.832.

Corrected static pressure = 1.5 x 0.832 = 1.248 IWC

Corrected BHP = 4.0 x 0.832 = 3.328

Example 2: A system, located at 5,000 feet of elevation, is to deliver 6,000 CFM at a static pressure of 1.5”. Use the unit blower tables to select the blower speed and the BHP requirement.

Solution: As in the example above, no temperature information is given so 70°F is assumed.

The 1.5" static pressure given is at an elevation of 5,000 ft. The first step is to convert this static pressure to equivalent sea-level conditions.

Sea-level static pressure = 1.5 / 0.832 = 1.80"

Enter the blower table at 6000 sCFM and static pressure of 1.8”. The RPM listed will be the same RPM needed at 5,000 ft.

Suppose that the corresponding BHP listed in the blower table is 3.2.

This value must be corrected for elevation.

BHP at 5,000 ft = 3.2 x .832 = 2.66

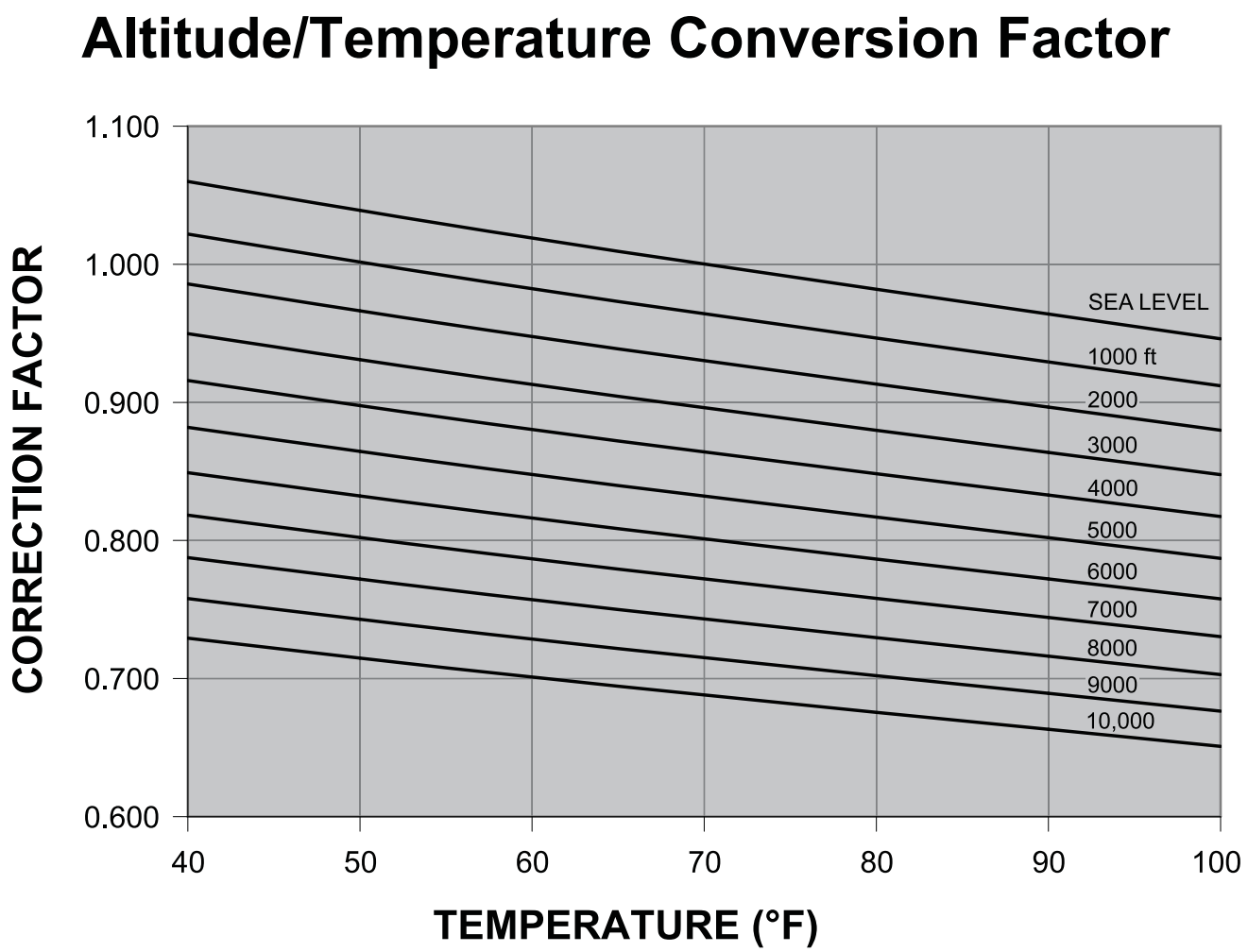


FIG. 2. ALTITUDE/TEMPERATURE CONVERSION FACTOR

Cooling Performance Data — 050 Model

TABLE 8 – COOLING PERFORMANCE DATA* - 50 TON (STANDARD CAPACITY)

Air on Evaporator Coil		Temperature of Air on Condenser Coil																		
		85°F									95°F									
CFM	WB (°F)	Total Cap.[1] (MBH)	Total[2] Input (kW)	Sensible Capacity (MBH) Return Dry Bulb (°F)							Total Cap.[1] (MBH)	Total[2] Input (kW)	Sensible Capacity (MBH) Return Dry Bulb (°F)						
				86	83	80	77	74	71	68			86	83	80	77	74	71	68
12000	73	684	45	402	364	324	287	247	-	-	653	50	390	352	312	275	235	-	-
	67	618	44	485	446	407	368	329	289	249	590	49	471	433	394	355	317	277	237
	62	574	43	562	520	476	437	397	358	318	550	48	549	508	465	423	384	345	305
	56	571	43	571	555	539	523	484	442	400	550	47	550	534	518	502	471	428	386
14000	73	702	45	428	385	341	296	252	-	-	670	50	415	372	329	284	240	-	-
	67	636	44	523	479	434	390	345	299	254	608	49	514	466	421	377	332	287	241
	62	604	44	604	568	518	469	424	378	333	581	48	581	555	506	456	410	365	320
	56	603	43	603	586	568	551	526	476	427	581	48	581	563	546	529	511	463	413
16000	73	716	46	452	404	355	305	255	-	-	683	50	439	391	343	292	243	-	-
	67	652	45	565	510	460	410	360	309	258	623	49	555	497	447	397	347	296	245
	62	632	44	632	612	559	500	448	397	346	607	48	607	589	545	489	435	384	333
	56	631	44	631	612	593	575	556	511	453	606	48	606	588	569	551	533	498	441
18000	73	728	46	475	421	368	312	258	-	-	694	50	462	409	355	300	246	-	-
	67	666	45	605	539	484	429	374	317	261	636	49	594	531	471	415	360	304	248
	62	655	44	655	635	596	533	472	415	359	629	49	629	610	583	521	458	402	345
	56	654	44	654	634	614	595	575	544	481	629	48	629	609	589	570	551	529	466
20000	73	737	46	496	438	380	320	260	-	-	702	50	483	425	367	307	248	-	-
	67	679	45	646	574	507	446	386	325	264	649	49	633	560	493	433	373	311	251
	62	675	44	675	654	632	564	494	432	370	648	49	648	628	607	552	480	418	357
	56	674	44	674	653	632	612	592	572	506	647	49	648	627	607	586	567	547	492
22000	73	744	46	516	453	391	326	262	-	-	709	51	503	440	378	313	250	-	-
	67	692	45	682	604	528	463	398	334	266	665	49	665	592	514	449	385	320	253
	62	692	45	692	670	649	594	515	448	381	665	49	665	643	622	581	506	434	367
	56	691	45	691	670	648	627	606	585	531	664	49	664	643	621	601	580	560	518
24000	73	751	46	535	468	401	332	264	-	-	715	51	521	454	388	319	252	-	-
	67	708	45	708	637	548	478	409	340	269	680	50	680	626	534	465	396	327	256
	62	707	44	708	685	663	624	540	463	391	679	49	679	657	635	610	526	449	377
	56	707	44	707	684	662	640	618	597	555	678	49	678	656	635	613	592	571	541
		105°F									115°F									
12000	73	619	55	376	338	299	261	222	-	-	580	61	360	323	285	246	207	-	-
	67	558	54	457	418	380	341	303	263	223	524	60	444	403	364	326	287	248	209
	62	526	53	526	493	450	409	369	330	291	499	59	499	478	436	393	254	314	275
	56	526	53	526	510	494	478	456	413	371	499	59	499	483	468	453	438	398	355
14000	73	634	55	401	358	315	270	226	-	-	594	61	386	343	300	255	211	-	-
	67	575	54	499	451	407	362	318	273	228	540	60	486	435	391	347	302	257	212
	62	555	53	555	538	492	443	395	350	305	526	59	527	510	477	427	379	334	289
	56	555	53	555	538	521	504	487	449	398	526	59	526	509	493	476	460	433	384
16000	73	646	55	425	377	329	278	229	-	-	604	61	409	361	313	263	214	-	-
	67	589	54	540	486	432	382	332	281	231	553	60	527	470	416	366	316	266	215
	62	580	53	580	561	532	474	420	369	318	549	59	549	531	514	460	403	353	302
	56	579	53	579	561	543	525	507	483	426	548	59	548	531	513	496	478	461	411
18000	73	655	56	447	394	341	286	232	-	-	613	62	431	378	325	270	216	-	-
	67	603	55	580	516	455	400	346	289	234	568	60	565	503	439	384	329	273	219
	62	600	54	600	581	562	507	443	403	330	568	60	568	549	531	492	429	370	314
	56	600	54	600	580	561	543	524	519	452	567	60	567	549	530	512	494	476	436
20000	73	663	56	468	410	353	293	234	-	-	619	62	452	394	337	277	219	-	-
	67	618	55	618	548	478	418	358	298	237	585	60	585	534	461	401	342	282	221
	62	618	54	618	598	578	538	468	403	341	584	60	584	565	545	522	451	386	325
	56	617	54	617	597	577	558	538	519	478	584	60	584	564	545	526	507	488	461
22000	73	669	56	488	425	363	299	236	-	-	625	62	471	409	347	283	221	-	-
	67	634	55	634	679	499	434	370	305	239	599	61	599	568	488	417	353	289	223
	62	634	54	633	612	592	567	490	418	352	598	60	598	578	558	538	476	401	335
	56	633	54	633	612	591	571	551	531	502	598	60	598	577	557	538	518	499	480
24000	73	674	56	506	439	373	308	238	-	-	629	62	489	423	357	292	223	-	-
	67	647	55	647	614	526	449	380	312	241	611	61	611	590	514	433	364	295	225
	62	647	55	647	625	604	583	514	433	362	611	61	610	590	569	549	498	416	345
	56	646	55	646	625	603	582	561	540	521	610	61	610	589	568	548	528	508	489

* Rated performance is at sea level. Cooling capaciites are gross cooling capacity.

Cooling Performance Data — 051 Model

TABLE 9 – COOLING PERFORMANCE DATA* - 55 TON (HIGH CAPACITY)

Air on Evaporator Coil		Temperature of Air on Condenser Coil																		
		85°F									95°F									
CFM	WB (°F)	Total Cap.[1] (MBH)	Total[2] Input (kW)	Sensible Capacity (MBH) Return Dry Bulb (°F)							Total Cap.[1] (MBH)	Total[2] Input (kW)	Sensible Capacity (MBH) Return Dry Bulb (°F)						
				86	83	80	77	74	71	68			86	83	80	77	74	71	68
12000	73	704	48	413	374	334	295	255	-	-	672	53	400	361	321	283	242	-	-
	67	636	47	496	457	417	378	338	298	257	607	51	483	443	404	365	325	285	244
	62	590	46	572	531	487	447	407	367	327	564	51	559	516	475	434	394	354	313
	56	584	45	584	568	551	535	-	-	-	562	50	562	546	530	514	480	438	395
14000	73	723	48	441	396	351	305	259	-	-	690	53	427	383	338	293	247	-	-
	67	655	47	537	492	446	401	355	309	262	624	52	523	478	433	387	342	296	249
	62	619	46	619	579	530	481	435	389	342	595	51	595	565	515	467	421	375	329
	56	618	46	618	600	582	565	537	487	439	594	51	594	577	559	542	522	474	424
16000	73	738	48	467	417	366	315	263	-	-	704	53	454	404	353	302	250	-	-
	67	672	47	580	525	474	423	371	319	266	640	52	566	511	460	409	358	305	252
	62	647	47	647	625	571	514	462	409	357	622	51	622	603	557	502	448	395	343
	56	646	46	646	627	608	589	571	522	466	621	51	621	602	584	565	547	508	451
18000	73	750	49	492	436	381	323	266	-	-	715	53	479	423	367	310	253	-	-
	67	686	47	621	557	501	443	386	328	269	656	52	606	543	487	429	372	314	256
	62	671	47	671	651	611	548	487	429	370	645	51	645	625	596	533	473	415	356
	56	670	47	670	650	630	610	590	556	494	644	51	644	624	604	585	566	541	479
20000	73	760	49	516	455	394	331	269	-	-	724	54	503	442	381	318	256	-	-
	67	699	48	660	593	526	463	400	336	272	667	52	647	578	512	449	386	322	259
	62	692	47	692	671	646	581	511	447	383	664	52	664	644	623	565	497	433	369
	56	691	47	691	670	649	628	608	586	519	664	52	664	643	622	602	582	562	506
22000	73	768	49	539	473	407	339	272	-	-	731	54	526	460	393	326	259	-	-
	67	711	48	698	622	550	482	414	344	275	681	52	681	611	536	468	400	332	262
	62	710	47	710	688	666	610	534	465	395	682	52	682	660	638	597	519	451	381
	56	709	47	709	687	665	644	622	601	546	681	52	681	659	637	616	596	575	531
24000	73	775	49	561	490	419	346	274	-	-	737	54	547	477	405	333	261	-	-
	67	726	48	726	655	573	500	427	353	278	697	53	697	642	558	486	413	339	265
	62	726	47	726	703	680	640	556	482	407	697	52	697	674	652	625	546	468	393
	56	725	47	725	702	680	657	635	613	570	696	52	696	673	651	629	608	586	554
		105°F									115°F									
12000	73	636	58	385	347	307	268	228	-	-	597	64	370	331	293	253	213	-	-
	67	574	57	467	429	389	350	311	270	230	539	63	454	412	373	334	295	255	214
	62	539	56	539	502	460	418	379	339	299	511	62	511	486	445	402	362	323	283
	56	538	56	538	522	506	490	464	422	380	510	62	510	495	479	464	448	406	364
14000	73	653	58	413	368	324	278	232	-	-	611	65	397	352	308	263	217	-	-
	67	592	57	511	463	418	373	327	281	235	555	63	496	446	401	356	311	265	218
	62	569	56	569	549	501	452	406	360	314	539	63	539	522	485	437	389	343	297
	56	568	56	568	550	533	516	499	458	408	538	62	538	521	505	488	472	442	393
16000	73	665	59	439	389	339	287	236	-	-	622	65	422	373	323	271	220	-	-
	67	606	57	553	495	445	394	343	290	238	569	64	537	482	428	377	326	274	222
	62	594	57	594	575	542	486	432	380	328	562	63	562	544	524	471	415	363	311
	56	593	57	593	574	556	538	520	493	437	561	63	561	543	526	508	491	473	421
18000	73	675	59	464	408	353	296	239	-	-	631	65	447	392	336	280	223	-	-
	67	619	58	592	531	471	414	357	299	241	583	64	576	516	454	397	341	283	225
	62	615	57	615	596	576	519	457	399	341	582	63	582	563	544	503	439	382	324
	56	614	57	614	595	576	556	538	519	464	581	63	581	562	543	525	507	489	448
20000	73	683	59	487	427	366	303	242	-	-	638	65	471	410	349	287	226	-	-
	67	633	58	630	565	496	434	371	307	244	599	64	599	549	478	417	354	292	228
	62	633	57	633	613	593	550	480	417	353	599	64	599	579	559	533	466	400	336
	56	633	57	633	612	592	572	553	533	490	598	64	598	578	559	539	520	501	472
22000	73	690	59	510	444	378	311	244	-	-	644	65	493	428	362	295	228	-	-
	67	650	58	650	597	519	452	384	316	247	614	64	614	581	506	435	367	300	231
	62	649	58	649	628	607	579	507	435	365	613	64	613	593	572	552	491	417	348
	56	649	58	649	627	607	586	565	545	514	613	64	613	592	572	552	532	513	493
24000	73	695	59	532	461	390	318	246	-	-	649	66	515	444	374	303	231	-	-
	67	664	58	664	626	547	470	397	324	249	627	64	627	605	533	453	380	307	233
	62	663	58	663	641	620	598	528	452	377	626	64	626	605	584	563	515	434	359
	56	663	58	663	641	619	598	577	556	534	625	64	625	604	583	563	542	522	502

* Rated performance is at sea level. Cooling capaciites are gross cooling capacity.

Cooling Performance Data — 060 Model

TABLE 10 – COOLING PERFORMANCE DATA* - 60 TON (STANDARD CAPACITY)

Air on Evaporator Coil		Temperature of Air on Condenser Coil																		
		85°F									95°F									
CFM	WB (°F)	Total Cap.[1] (MBH)	Total[2] Input (kW)	Sensible Capacity (MBH) Return Dry Bulb (°F)							Total Cap.[1] (MBH)	Total[2] Input (kW)	Sensible Capacity (MBH) Return Dry Bulb (°F)						
				86	83	80	77	74	71	68			86	83	80	77	74	71	68
12000	73	802	55	456	416	375	336	295	-	-	768	60	441	402	361	322	281	-	-
	67	722	53	539	499	459	419	379	338	296	691	59	524	484	444	404	364	323	282
	62	664	52	612	571	529	488	448	407	366	636	57	598	556	514	473	433	392	352
	56	644	51	644	626	-	-	-	-	-	621	57	621	604	586	-	-	-	-
14000	73	830	55	486	441	394	348	301	-	-	793	61	471	426	380	333	286	-	-
	67	749	54	583	537	491	445	398	351	303	715	59	568	522	476	429	383	336	288
	62	692	53	671	622	572	525	478	431	384	663	58	656	606	559	510	463	416	369
	56	685	52	685	666	646	627	578	530	480	660	57	660	641	622	603	563	514	465
16000	73	852	56	515	464	412	359	306	-	-	813	61	500	449	397	344	291	-	-
	67	769	54	625	573	521	469	416	362	308	736	59	613	558	505	453	401	347	293
	62	722	53	722	672	616	560	507	454	401	695	58	695	656	602	544	491	438	385
	56	721	52	721	700	679	658	623	566	510	694	58	694	673	653	633	607	551	494
18000	73	869	56	543	486	428	369	310	-	-	828	61	528	470	413	354	295	-	-
	67	788	54	670	608	550	491	433	373	313	751	60	654	592	534	476	417	357	297
	62	752	53	752	720	658	594	535	475	416	724	59	724	702	643	581	519	460	400
	56	751	53	751	729	707	685	663	602	539	723	58	723	701	679	658	637	587	522
20000	73	883	56	570	507	444	379	313	-	-	841	62	554	491	428	363	298	-	-
	67	804	55	714	642	578	514	449	383	316	766	60	697	628	562	497	433	367	301
	62	779	54	779	755	699	630	562	496	430	749	59	749	726	683	613	545	480	414
	56	778	53	778	754	731	708	685	638	569	748	59	748	725	702	680	657	622	552
22000	73	894	57	596	527	458	388	317	-	-	852	62	580	511	443	372	301	-	-
	67	816	55	753	680	605	535	464	392	320	780	60	738	663	589	518	448	376	304
	62	803	54	803	778	739	663	588	516	444	772	59	771	747	721	648	571	500	428
	56	802	54	802	777	753	728	705	672	595	771	59	770	746	722	699	676	652	580
24000	73	904	57	621	547	472	396	320	-	-	860	62	605	531	456	380	304	-	-
	67	831	55	796	712	631	555	479	402	323	793	60	778	698	614	539	462	386	308
	62	824	54	824	798	772	696	612	535	457	791	60	791	766	741	680	595	519	441
	56	823	54	823	797	771	746	722	697	623	790	60	790	765	740	716	692	668	608
		105°F									115°F									
12000	73	730	66	425	386	345	306	265	-	-	688	74	408	369	329	289	249	-	-
	67	657	65	508	468	428	388	348	308	266	619	72	490	450	411	371	331	291	250
	62	604	64	581	539	497	457	417	376	336	571	71	564	522	481	439	399	359	319
	56	596	63	596	579	562	543	501	458	417	568	70	568	552	535	519	484	442	400
14000	73	753	67	455	410	364	318	271	-	-	709	74	437	392	347	300	254	-	-
	67	678	65	550	505	459	413	367	320	272	640	72	535	487	441	395	349	302	255
	62	634	64	634	590	541	493	446	400	353	604	71	604	572	524	475	428	382	335
	56	633	64	633	614	596	577	546	497	448	603	71	603	585	567	549	528	479	430
16000	73	770	67	483	432	381	328	275	-	-	724	74	465	414	363	311	258	-	-
	67	697	66	595	540	488	436	384	330	277	657	73	579	522	470	418	366	313	259
	62	665	64	666	639	584	527	474	421	368	633	72	633	614	566	511	456	403	350
	56	664	64	664	644	624	605	585	533	477	632	71	632	613	593	574	555	516	460
18000	73	784	68	511	453	396	338	278	-	-	737	75	492	435	378	320	261	-	-
	67	713	66	639	574	517	458	400	341	281	671	73	621	559	498	440	382	323	263
	62	693	65	693	671	626	563	501	442	383	658	72	658	638	607	546	483	424	365
	56	692	65	692	670	649	628	608	570	507	657	72	657	637	616	596	576	551	488
20000	73	796	68	537	474	411	347	282	-	-	747	75	519	456	393	329	264	-	-
	67	727	66	681	612	544	480	416	350	284	684	73	662	592	525	461	397	332	267
	62	716	65	716	694	665	597	527	462	397	680	72	680	658	637	580	508	444	378
	56	715	65	715	693	671	649	627	603	535	679	72	679	657	636	615	594	573	516
22000	73	805	68	563	494	425	355	285	-	-	755	75	544	476	407	337	268	-	-
	67	741	66	722	648	571	501	431	360	288	700	73	700	628	551	482	412	342	270
	62	737	65	737	713	690	631	552	482	410	699	73	699	677	654	612	537	463	391
	56	736	65	736	713	689	666	644	621	562	698	73	699	676	653	631	609	587	544
24000	73	813	68	588	513	439	363	287	-	-	762	75	569	495	421	345	270	-	-
	67	756	67	756	679	596	521	445	369	291	717	74	717	662	582	502	426	350	272
	62	755	66	755	731	707	663	581	501	423	716	73	716	693	669	642	562	482	404
	56	754	66	755	730	706	682	659	635	590	715	73	715	692	668	646	623	600	569

* Rated performance is at sea level. Cooling capaciites are gross cooling capacity.

Cooling Performance Data — 061 Model

TABLE 11 – COOLING PERFORMANCE DATA* - 65 TON (HIGH CAPACITY)

Air on Evaporator Coil		Temperature of Air on Condenser Coil																		
		85°F									95°F									
CFM	WB (°F)	Total Cap.[1] (MBH)	Total[2] Input (kW)	Sensible Capacity (MBH) Return Dry Bulb (°F)							Total Cap.[1] (MBH)	Total[2] Input (kW)	Sensible Capacity (MBH) Return Dry Bulb (°F)						
				86	83	80	77	74	71	68			86	83	80	77	74	71	68
12000	73	815	56	461	421	381	341	300	-	-	780	62	446	407	366	327	286	-	-
	67	733	55	544	504	464	424	384	343	301	702	60	529	489	449	409	369	328	287
	62	673	53	618	576	534	493	453	412	371	645	59	602	561	519	478	438	397	357
	56	651	52	651	-	-	-	-	-	-	629	58	629	611	-	-	-	-	-
14000	73	844	57	492	446	399	354	306	-	-	806	62	477	431	385	339	291	-	-
	67	760	55	589	543	496	450	404	356	308	727	61	573	527	481	435	388	341	293
	62	702	54	676	627	577	531	484	437	389	673	59	661	612	563	515	468	421	374
	56	693	53	694	674	654	-	-	-	-	669	59	669	649	630	611	568	519	470
16000	73	866	57	521	470	418	365	311	-	-	827	63	505	454	403	350	296	-	-
	67	782	56	631	579	527	474	422	368	314	747	61	617	563	511	458	406	352	298
	62	731	54	730	678	622	566	513	459	406	704	60	704	661	606	550	497	444	390
	56	730	54	730	708	687	667	628	571	516	703	59	703	682	662	641	612	556	500
18000	73	884	58	549	492	434	375	316	-	-	843	63	533	476	419	360	300	-	-
	67	801	56	676	614	556	497	438	379	318	764	61	659	598	540	481	423	363	303
	62	762	55	762	726	664	600	541	481	421	734	60	734	708	648	585	524	465	405
	56	761	54	761	738	716	694	670	608	544	733	60	733	710	689	667	646	592	528
20000	73	898	58	576	513	450	385	319	-	-	856	64	560	497	434	369	304	-	-
	67	817	56	718	648	584	519	455	389	322	779	62	703	633	567	503	438	373	306
	62	790	55	790	766	705	636	567	502	436	760	60	760	736	688	619	551	485	420
	56	789	55	789	765	741	718	694	644	573	759	60	759	735	712	689	667	628	557
22000	73	910	58	602	533	464	394	323	-	-	867	64	586	517	448	378	307	-	-
	67	831	56	760	683	611	541	470	398	326	793	62	744	669	594	524	454	382	310
	62	814	55	814	789	745	669	594	522	450	782	61	782	758	727	653	576	505	433
	56	813	55	813	788	763	739	714	678	601	781	61	781	757	733	709	685	659	585
24000	73	920	59	628	553	479	402	326	-	-	876	64	611	537	462	386	310	-	-
	67	844	57	801	718	638	561	485	407	329	806	62	784	703	620	545	468	391	313
	62	836	56	836	809	780	702	618	541	463	803	61	803	777	752	685	601	524	446
	56	835	56	835	808	783	757	732	706	629	802	61	802	776	751	726	702	678	613

		105°F									115°F								
12000	73	742	68	430	391	350	311	270	-	-	701	76	413	374	334	294	254	-	-
	67	667	66	513	473	433	393	353	312	271	630	74	495	456	416	376	336	296	255
	62	614	65	586	544	502	462	422	381	341	581	73	569	527	486	445	404	364	324
	56	604	64	604	587	569	-	-	-	-	577	72	577	560	543	527	489	447	405
14000	73	766	69	460	415	369	323	276	-	-	722	76	442	397	352	306	259	-	-
	67	690	67	556	510	464	418	372	325	277	651	74	539	492	446	401	354	307	260
	62	643	66	641	595	547	498	451	405	358	613	73	613	577	529	480	434	387	340
	56	641	65	642	623	604	585	551	502	453	612	72	612	594	575	557	534	484	435
16000	73	784	69	489	437	386	333	280	-	-	738	77	471	420	368	316	263	-	-
	67	710	67	601	546	494	442	389	336	282	669	75	583	527	476	424	371	318	264
	62	675	66	675	644	589	532	480	427	373	643	73	643	622	571	517	462	409	356
	56	674	66	674	653	633	613	593	539	482	642	73	642	622	603	583	564	521	465
18000	73	799	70	516	459	402	343	284	-	-	751	77	498	441	384	325	266	-	-
	67	726	68	644	580	522	464	405	346	286	683	75	626	563	504	446	387	328	268
	62	703	66	703	681	631	568	507	448	388	668	74	669	648	613	550	488	429	370
	56	702	66	702	680	659	638	617	575	512	668	74	668	647	626	606	585	556	493
20000	73	810	70	543	480	417	352	287	-	-	762	77	524	461	399	334	269	-	-
	67	739	68	685	618	550	485	421	355	289	697	75	667	598	531	467	403	337	272
	62	727	67	727	704	671	602	533	468	402	691	74	691	669	646	585	514	449	384
	56	726	67	726	703	681	658	636	609	540	690	74	690	668	646	625	604	583	522
22000	73	820	70	568	500	431	361	290	-	-	770	77	550	481	412	343	273	-	-
	67	753	68	727	652	576	506	436	365	293	711	75	706	634	557	488	417	346	275
	62	748	67	748	724	700	636	558	487	416	711	75	711	688	665	617	542	469	397
	56	747	67	747	723	700	677	654	631	567	710	75	710	687	664	641	619	598	549
24000	73	828	70	593	519	445	369	293	-	-	778	78	574	500	426	351	276	-	-
	67	768	68	764	685	602	527	451	374	296	729	76	729	668	585	507	432	356	278
	62	767	68	767	742	718	668	587	506	429	728	75	728	704	680	648	567	487	410
	56	766	68	766	741	717	693	669	645	595	727	75	727	703	680	656	633	611	575

Supply Fan Data

TABLE 12 – 28" x 28" FORWARD-CURVED FAN

CFM STD. AIR	Total Static Pressure (inches of water column)											
	1.0		2.0		3.0		4.0		5.0		6.0	
	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM
12000					12.3	639	16.8	730	21.5	808	26.4	879
14000					14.3	642	19.2	738	24.3	818	29.7	890
16000			10.8	528	16.2	642	21.8	742	27.3	826	33.2	900
18000			12.7	537	18	643	24.4	742	30.6	829	36.8	906
20000	10.4	447	15	550	20.3	648	26.8	742	33.9	830	40.8	908
22000	12.9	471	17.6	566	23.3	657	29.4	745	36.9	830		
24000	15.7	496	20.8	586	26.8	700	33	752	40	832		
26000	19.1	522	24.5	607	30.5	686	37.3	762				

TABLE 13 – 28" AIRFOIL FAN

CFM STD. AIR	Total Static Pressure (inches of water column)											
	1.0		2.0		3.0		4.0		5.0		6.0	
	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM
12000							12.6	1133	15.9	1241	19.5	1343
14000	5.2	806	8.1	947	11.4	1068	14.8	1177	18.4	1278	22.1	1374
16000	6.8	877	10	1011	13.5	1125	17.3	1228	21.2	1324	25.2	1415
18000	8.7	951	12.3	1077	16	1186	20.1	1285	24.3	1376	28.7	1462
20000	10.9	1027	15	1146	19	1251	23.3	1345	27.9	1433	32.6	1515
22000	13.6	1105	18.1	1218	22.4	1318	26.9	1409	31.8	1493	36.8	1572
24000	16.6	1184	21.7	1291	26.5	1387	31.2	1474	36.2	1556		
26000	20.2	1265	25.7	1366	31	1457	36.1	1542				

Component Static Pressure Drops

TABLE 14 – COMPONENT STATIC PRESSURE DROPS 050-061 MODELS

Component	CFM							
	10,000	12,000	14,000	16,000	18,000	20,000	22,000	24,000
Evap Coil 50 Ton								
Dry	0.19	0.21	0.24	0.27	0.31	0.36	0.40	0.46
Wet	0.24	0.27	0.31	0.35	0.39	0.44	0.50	0.57
Evap Coil 60 Ton								
Dry	0.25	0.28	0.32	0.37	0.42	0.47	0.54	0.61
Wet	0.32	0.36	0.41	0.46	0.52	0.59	0.67	0.76
Return Air								
Bottom	0.05	0.07	0.09	0.12	0.15	0.18	0.22	0.27
Side	0.09	0.13	0.18	0.23	0.30	0.37	0.44	0.53
Rear	0.04	0.06	0.08	0.10	0.12	0.15	0.19	0.22
Filters								
2" Throwaway	0.07	0.08	0.09	0.11	0.12	0.13	0.15	0.16
2" Cleanable	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.07
2" Pleated	0.06	0.07	0.08	0.10	0.12	0.14	0.16	0.19
2" Carbon	0.08	0.11	0.14	0.17	0.20	0.23	0.26	0.29
Rigid Filter Rack	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Rigid 12", 65%	0.16	0.19	0.22	0.25	0.29	0.34	0.40	0.46
Rigid 12", 95%	0.31	0.37	0.44	0.53	0.64	0.77	0.92	1.10
Outside Air	0.10	0.14	0.19	0.25	0.31	0.38	0.46	0.55
Power Exhaust	0.01	0.01	0.02	0.02	0.03	0.04	0.05	0.06
Gas Heat								
375 MBH	0.03	0.05	0.06	0.08	0.11	0.13	0.16	0.19
750 MBH	0.05	0.07	0.10	0.13	0.16	0.20	0.24	0.29
1125 MBH	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30

Exhaust Fan Data

EXHAUST FAN MOTOR SIZING INSTRUCTIONS

In order to determine the proper exhaust fan motor size, add the return duct static pressure to the appropriate damper pressure drop value in Table 14 to get the total static pressure applied to the exhaust fan. Based on the exhaust fan airflow and total static pressure, determine the brake horsepower and RPM of the exhaust fan.

TABLE 15 – FORWARD-CURVED FAN

CFM STD. AIR	Total Static Pressure (inches of water column)							
	0.3		0.5		0.8		1	
	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM
6000								
8000								
10000								
12000								
14000							5.4	645
16000	5	528	5.7	584	6.4	633	7.2	680
18000	6.8	579	7.7	632	8.5	678	9.3	721
20000	9.1	632	10.1	681	11.1	725	12	765
22000	11.8	685	13	731	14.1	772	15.1	811
24000	15.1	739	16.4	782	17.6	821	18.8	858
26000	18.9	794						

NOTE: For performance at operating points not included in these tables, consult your local YORK representative.

Electrical Data

ELECTRICAL SERVICE SIZING

In order to use the electrical service required for the cooling-only Eco² rooftop, use the appropriate calculations listed below from U.L. 1995. Based on the configuration of the rooftop, the calculations will yield different MCA (minimum circuit ampacity), and MOP (maximum overcurrent protection).

Using the following load definitions and calculations, determine the correct electrical sizing for your unit. All concurrent load conditions must be considered in the calculations, and you must use the highest value for any combination of loads.

Load Definitions:

- **LOAD1** is the current of the largest motor – compressor or fan motor.
- **LOAD2** is the sum of the remaining motor currents that may run concurrently with LOAD1.
- **LOAD3** is the current of the electric heaters – zero for cooling-only units.
- **LOAD4** is the sum of any remaining currents greater than or equal to 1.0 amp.

Use the following calculations to determine MCA and MOP for units supplied with a single-point power connection:

MCA = (1.25 x LOAD1) + LOAD2 + LOAD3 + LOAD4

MOP = (2.25 x LOAD1) + LOAD2 + LOAD3 + LOAD4

If the MOP does not equal a standard current rating of an overcurrent protective device, then the marked maximum rating is to be the next lower standard rating. However, if the device selected for MOP is less than the MCA, then select the lowest standard maximum fuse size greater than or equal to the MCA.

TABLE 16 – COMPRESSOR ELECTRICAL DATA

Model	Compressor	Model	Nominal Voltage					
			208-230/3/60		460/3/60		575/3/60	
			RLA*	LRA	RLA*	LRA	RLA*	LRA
050	1A	ZP120	33.3	239	17.9	125	12.8	80
	1B	ZP137	48.0	245	18.6	125	14.7	100
	2A	ZP121	33.3	239	17.9	125	12.8	80
	2B	ZP137	48.0	245	18.6	125	14.7	100
051	1A	ZP137	48.0	245	18.6	125	14.7	100
	1B	ZP137	48.0	245	18.6	125	14.7	100
	2A	ZP137	48.0	245	18.6	125	14.7	100
	2B	ZP137	48.0	245	18.6	125	14.7	100
060	1A	ZP137	48.0	245	18.6	125	14.7	100
	1B	ZP182	55.7	340	26.9	172	23.7	132
	2A	ZP137	48.0	245	18.6	125	14.7	100
	2B	ZP182	55.7	340	26.9	172	23.7	132
061	1A	ZP154	51.3	300	22.4	150	19.8	109
	1B	ZP182	55.7	340	25.0	172	23.7	132
	2A	ZP137	48.0	245	18.6	125	14.7	100
	2B	ZP182	55.7	340	25.0	172	23.7	132

TABLE 17 – POWER SUPPLY VOLTAGE LIMITS

Power Supply	Minimum Voltage	Maximum Voltage
208V/3Ph/60Hz	187	228
230V/3Ph/60Hz	207	253
460V/3Ph/60Hz	414	506
575V/3Ph/60Hz	518	632

TABLE 18 – SUPPLY AND EXHAUST FAN MOTOR DATA - ODP

High Efficiency				
Motor HP	Nominal Voltage			
	208/3/60	230/3/60	460/3/60	575/3/60
	FLA	FLA	FLA	FLA
5	14.0	13.8	6.9	5.3
7.5	21.7	20.0	10.0	8.2
10	28.2	26.0	13.0	11.0
15	41.0	38.0	19.0	16.2
20	53.0	48.0	24.0	19.8
25	66.0	62.0	31.0	23.8
30	84.0	72.0	36.0	29.0
40	106.0	98.0	49.0	38.8

Premium Efficiency				
Motor HP	Nominal Voltage			
	208/3/60	230/3/60	460/3/60	575/3/60
	FLA	FLA	FLA	FLA
5	13.8	13.2	6.6	5.2
7.5	20.0	19.4	9.7	7.4
10	26.0	25.0	12.5	10.3
15	37.4	35.4	17.7	14.1
20	49.4	47.0	23.5	18.9
25	63.3	60.0	30.0	24.2
30	74.1	70.0	35.0	28.0
40	97.5	92.0	46.0	37.4

TABLE 19 – SUPPLY AND EXHAUST FAN MOTOR DATA - TEFC

High Efficiency				
Motor HP	Nominal Voltage			
	208/3/60	230/3/60	460/3/60	575/3/60
	FLA	FLA	FLA	FLA
5	15.4	14.2	7.1	5.4
7.5	21.2	19.6	9.8	8.2
10	27.5	25.6	12.8	11.4
15	40.0	37.0	18.5	15.3
20	54.0	50.0	25.0	19.1
25	64.0	60.0	30.0	25.0
30	78.0	72.0	36.0	29.6
40	101.0	94.0	47.0	38.0

Premium Efficiency				
Motor HP	Nominal Voltage			
	208/3/60	230/3/60	460/3/60	575/3/60
	FLA	FLA	FLA	FLA
5	13.6	13.0	6.5	5.2
7.5	21.0	18.8	9.4	8.0
10	26.0	25.0	12.5	10.0
15	38.9	37.0	18.5	14.8
20	51.0	48.0	24.0	19.0
25	63.3	60.0	30.0	23.9
30	77.0	72.0	36.0	29.0
40	99.0	92.0	46.0	36.8

TABLE 20 – CONDENSER FAN MOTOR RLA

RLA Each Motor		208V/3PH/60HZ	230V/3PH/60HZ	460V/3PH/60HZ	575V/3PH/60HZ
		7.3	6.2	3.1	2.5
UNIT SIZE	QUANTITY OF FANS	208V/3PH/60HZ	230V/3PH/60HZ	460V/3PH/60HZ	575V/3PH/60HZ
50-65 Tons	4	29.2	24.8	12.4	10.0

TABLE 21 – MISCELLANEOUS DATA

Description	Nominal Voltage		
	208V/230V	460V	575V
	AMPS	AMPS	AMPS
Contrl Transformer 0.5 KVA	2.4	1.1	0.9
Convenience Outlet	9.6	4.4	3.5
Gas Heat	9.6	4.4	3.5

Controls

CONTROL SEQUENCES FOR SIMPLICITY ELITE CONTROLLED UNITS

GENERAL

The control system for the YORK Eco² Packaged Rooftop Unit is fully self-contained and based around a Rooftop Unit controller. To aid in unit setup, unit controller is equipped with a user visual LCD interface that consists of a 2 character above a 4-character display on the front of the Simplicity Elite control board. The two digit indicates the parameter of point number, and the 4-digit displays the current value or setting such as time delay, cooling set point temperature, etc. This interface provides verification of the systems operating status, enables field installed options, and aids in troubleshooting system faults.

Four program buttons, located around the LCDs, allow the user to view and/or change 89 default parameter settings, acknowledge 42 alarm codes, and perform a unit run test. Up to five (5) alarm Codes are displayed on the 4-character LCD.

Greater access to programming can be gained through a Palm Pilot or Personal Computer (PC). Additionally, up to 64 of the Simplicity family of controllers can be networked together using a 3-conductor shielded cable to communicate with your PC via the available YORK recommended FREE net Serial Adapter and free YORK downloaded software.

An LED located on the lower center of the board provides a flash rate of 1 second (heart beat) when no alarms are present. A flash rate of 250 ms indicated that a current alarm is present. The LED lights up constantly if the board has failed and needs replaced, and will not light when the board power is lost.

See the YPAL unit Installation/Operations Manual (IOM) For 100.50-NOM6 (1107) for further Simplicity Elite technical information about the normal Sequence of Operation and user selectable options for our customized applications.

Some common selections include Occupied/Unoccupied/recovery scheduling, equalized runtime for compressors, Morning warm-up, Economizer operation, Comfort, and Demand ventilation.

For the maximum in system flexibility, the YORK Eco² Packaged Rooftop Unit can be operated by either a typical 7-wire thermostat (2 cool/2 heat), a space temperature sensor, or stand-alone (VAV only). Note, a field wiring terminal block is provided to facilitate unit setup and installation.

In lieu of the hard-wired control options, the rooftop unit controller can be connected to and operated by a Building Automation System (BAS). The Rooftop Unit controller is equipped with a Modbus (RTU) communication. Optional BACnet (MSTP) is available with a Modlinc translator, which allows communication to a BACNet (MSTP) based BAS.

UNOCCUPIED / OCCUPIED SWITCHING

Depending on application, the unit can be indexed between unoccupied and occupied modes of operation by one of three methods: hard-wired input, internal time clock, or BAS. A contact-closure input is provided for hard-wiring to an external indexing device such as a central time clock, thermostat with built-in scheduling, or a manual switch. The unit controller is also equipped with a built-in 7-day time clock which can be used, in lieu of the contact closure input, to switch the unit between Unoccupied and Occupied modes of operation. The internal time clock is fully configurable via the user interface and includes Holiday scheduling. In addition to the hard-wired input or the internal time clock, the unit can also be indexed between unoccupied and occupied modes of operation via BAS command.

GAS HEATING OPERATION

Units supplied with gas heat can be equipped with one, two, or three independently operated burner modules. Each module is a fully self-contained furnace with all necessary ignition controls, safeties, and gas valves. The rooftop Unit Controller determines how the furnaces are started and stopped and prevents furnace operation if the Supply Fan airflow is not sufficient or if the Supply Air Temperature is excessively high.

If a furnace module receives a signal to start from the Unit Controller, the ignition control engages the furnace inducer (draft) fan for a 30-second pre-purge cycle. At the end of the 30-second pre-purge, the ignition control will stop the furnace and allows the inducer fan to operate for a 30-second post-purge. Each furnace contains a direct-spark-ignition system and includes safeties for flame and inducer fan verification, high temperature and flame roll-out.

MORNING WARM-UP

Morning Warm-Up can be initialized by BAS or by the Unit Controller if the Intelli-Start is used. If the Intelli-Start is used, the Morning Warm-Up start time is calculated through an adaptive algorithm.

When Morning Warm-Up is required, the Unit Controller energizes the VAV heat relay, starts the Supply Fan and qualifies the Return Air Temperature for 5 minutes.

The internal heat source (Gas, HW/Steam, or Electric) is controlled to maintain the Return Air Temperature to

the Return Air Temperature Setpoint, Morning Warm-Up ends when occupancy occurs (BAS, Intelli-Start, or contact closure), or when the Maximum Morning Warm-Up Time has expired.

ECONOMIZER OPERATION

The unit can be equipped with one of three types of optional economizers: dry-bulb, single-enthalpy, or comparative-enthalpy. When the unit controller determines that Outside Air is suitable for economizing, the unit controller will control the outside air damper(s) open to provide economizer cooling. If economizer cooling alone is insufficient for the cooling load, the unit controller shall stage up compressors, one at a time, to meet demand.

The control logic for the three types of economizers is as follows:

Dry-Bulb Economizer

The dry-bulb economizer is the default economizer control scheme. With the dry-bulb economizer, the unit controller monitors the Outside Air temperature only and compares it to a reference temperature setting. Outside Air is deemed suitable for economizing when the Outside Air temperature is determined to be less than the reference temperature setting. This method of economizing is effective, but is prone to some changeover inefficiencies due to the fact that this method is based on sensible temperatures only and does not take Outside Air moisture content into consideration.

Single-Enthalpy Economizer

With the optional, single-enthalpy economizer, the unit controller monitors the Outside Air enthalpy in addition to the Outside Air temperature and compares it to a reference enthalpy setting and a reference temperature setting. Outside Air is deemed suitable for economizing when the Outside Air enthalpy is determined to be less than the reference enthalpy setting and the Outside Air temperature is less than the reference temperature setting. This method of economizing allows the reference temperature setting to be set higher than the dry-bulb Economizer and is a more efficient packaged rooftop economizer.

Dual-Enthalpy Economizer

With the optional, dual-enthalpy economizer, the unit controller monitors and compares the Outside Air and Return Air enthalpies, in addition to comparing the Outside Air temperature to the reference temperature setting. Outside Air is deemed suitable for economizing when the Outside Air enthalpy is determined to be less than the Return Air enthalpy and the Outside Air temperature is less than the reference temperature setting. This method of economizing is the most accurate and provides the highest degree of energy efficiency for a packaged rooftop economizer.

VENTILATION CONTROL SEQUENCES

Minimum OA Damper Position (CV Units)

When the unit goes into the Occupied mode of operation, the unit controller shall open the Outside Air Damper to a fixed minimum position. The damper shall remain at this position as long as the unit is in the occupied mode, and the economizer is not suitable for cooling.

Minimum OA Damper Position (VAV Units)

With Variable Air Volume units, there are two Minimum OA Damper Positions: one when the unit is at full speed and the second when the unit is at approximately half speed. These two points allow the control to linearly reset the position of the OA damper in response to fan speed.

When the unit goes into the Occupied mode of operation, the unit controller shall monitor the speed of the supply fan and open the Outside Air damper to a calculated minimum position based on the fan speed. This minimum position shall vary as the speed of the fan changes. The damper shall remain at this calculated position as long as the unit is in the occupied mode, and the economizer is not suitable for cooling.

EXHAUST CONTROL SEQUENCES

Barometric

The optional barometric exhaust system consists of a lightweight barometric relief damper installed on the end of the unit in the Return Air section. As more outside air is introduced into the controlled zone due to Economizer and Ventilation control sequences, the pressure inside the building rises. As building static pressure increases to overcome any exhaust duct static pressure, air will be allowed to escape through the barometric relief damper. Because this type of exhaust is not powered, the amount of air exhausted will be limited to the static pressure that will need to be overcome.

Powered, Variable-Volume Exhaust-Discharge Damper Controlled

This optional variable-volume, powered-exhaust system consists of a fixed-speed fan configured with a proportionally controlled discharge damper. The Rooftop Unit controller monitors the pressure inside the building and controls the Exhaust Damper and the Exhaust Fan. If the Building Pressure rises, the Exhaust Damper is

Controls *(continued)*

proportionally controlled open and the Exhaust Fan is controlled ON. If the Building Pressure falls, the Exhaust Damper is proportionally controlled closed and the Exhaust Fan is controlled OFF. The position of the Exhaust Damper in which the Exhaust Fan is controlled ON and OFF as well as the Building Pressure setpoint are user-selectable from the Rooftop Unit User Interface.

Powered, Variable-Volume Exhaust-VFD Controlled

This optional variable-volume, powered-exhaust system consists of an Exhaust Fan driven by a Variable Frequency Drive (VFD), which is controlled by the Rooftop Unit controller. The Rooftop Unit controller monitors the pressure within the building. As the pressure rises, the VFD is controlled to increase Exhaust Fan speed. As the pressure falls, the VFD is controlled to decrease Exhaust Fan speed. The Building Pressure Setpoint is user-selectable from the Rooftop Unit User Interface. On/Off control is maintained the same as Exhaust-Discharge Damper control stated above.

LOW-AMBIENT/HEAD-PRESSURE CONTROL OPERATION

The Rooftop Unit controller continuously monitors the outside air temperature to determine if mechanical cooling should be allowed. As a safety, if the Outside Air temperature falls to or below the Low Ambient Lockout temperature, mechanical cooling is prevented from operating.

For units with economizers, the Low Ambient Lockout temperature is typically low enough that mechanical cooling will rarely be required. However, for some applications, mechanical cooling is required when the Outside Air temperature is lower than the Low Ambient Lockout temperature.

For these applications, the unit must be equipped with optional Low Ambient controls. For optional Low Ambient operation, the Rooftop Unit controller monitors the refrigeration-system discharge pressure and controls the speed of the first stage condenser fan. If the discharge pressure falls, the speeds of the condenser fan is reduced to maintain acceptable condensing pressures in the refrigeration system. With the optional Low Ambient controls, mechanical cooling is allowed down to Outside Air temperatures of 0°F.

SMOKE PURGE SEQUENCE

A contact closure input (PURGE) is provided to place the unit in smoke purge mode. When the contact is closed the unit will operate as follows:

- Turn off all heating and cooling operation
- Set the outdoor air damper output to 100%
- Close the return to 0%
- Turn the supply fan on
- On VAV unit set the supply fan output to 100%.
- Turn the power exhaust fan on
- On VFD driven exhaust fans set the exhaust fan output to 100%

Note that 24 volts terminal (R) on the Simplicity control board must be used as the 24 Volt AC source for switch the contact to the Unit Controller Smoke Purge (PURGE) input. Use of any power source external to the controller will result in damage to the Unit Controller.

VAV SPECIFIC SEQUENCES

SUPPLY FAN OPERATION

For VAV units, the supply fan is controlled ON and OFF based on the occupancy state. When the unit goes into the Occupied mode of operation, the Rooftop Unit controller will monitor the static pressure within the supply-duct system and control the speed of the supply fan to maintain a specified Duct Static Pressure setpoint. A Variable Frequency Drive (VFD) is used on all VAV units to vary the speed of the supply fan. Note, the use of a VFD in lieu of inlet guide vanes provides for higher energy efficiency for the unit by eliminating the losses (air-pressure drop) typical of inlet guide vane systems.

CV SPECIFIC SEQUENCES

COOLING OPERATION

Thermostat Control

If a 7-wire thermostat (2 Cool/2 Heat) controls the unit, all zone-temperature setpoint-control is maintained at the thermostat. With this operation, the unit remains idle until it receives a stage call from the thermostat. If “G”

is called from the thermostat, the Supply Fan will start. Ventilation functions (if equipped) will be permitted to run with an occupied signal. Economizer functions will operate with a “G” call and a call for cooling.

HEATING OPERATION

Thermostat Control

If a 7-wire thermostat (2 Cool/2 Heat) controls the unit, all zone-temperature setpoint-control is maintained at the thermostat. With this operation, the unit remains idle until it receives a stage call from the thermostat. If “G” is called from the thermostat, the Supply Fan will start. Ventilation functions (if equipped) will be permitted to run with an occupied signal.

TABLE 22 – POWER-SUPPLY-CONDUCTOR SIZE RANGE

			Dual-Point TB	
Supply Voltage	**Single-Point TB**	**Single-Point Disconnect**	**TB 1**	**TB 2**
208V	(2*) 250 kcmil-500 kcmil	(2*) 2 AWG-500 kcmil	6 AWG-400 kcmil	6 AWG-350 kcmil
230V	(2*) 250 kcmil-500 kcmil	(2*) 2 AWG-500 kcmil	6 AWG-400 kcmil	6 AWG-350 kcmil
460V	6 AWG-400 kcmil	6 AWG-350 kcmil	14 AWG-2/0	14 AWG-2/0
575V	6 AWG-400 kcmil	6 AWG-350 kcmil	14 AWG-2/0	14 AWG-2/0

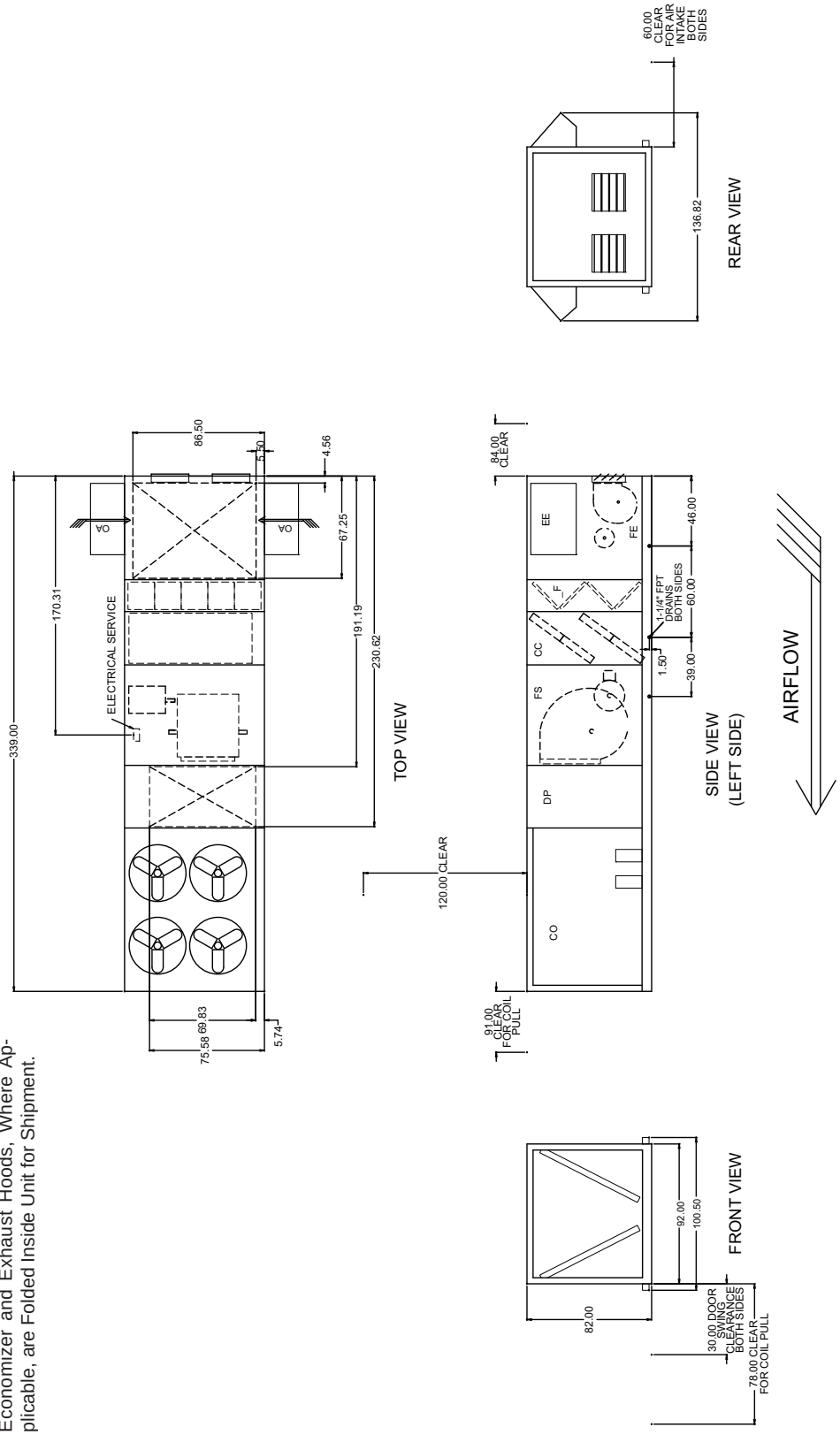
NOTE: 2* = Dual pairs per phase

General Arrangement Drawings

BOTTOM SUPPLY / BOTTOM RETURN

SECTION DESCRIPTIONS:

EE = Economizer
FE = Fan Exhaust
_F = Filter Segments
CC = Cooling Coils
FS = Supply Fan
DP = Discharge Plenum
CO = Condenser Section



NOTES:

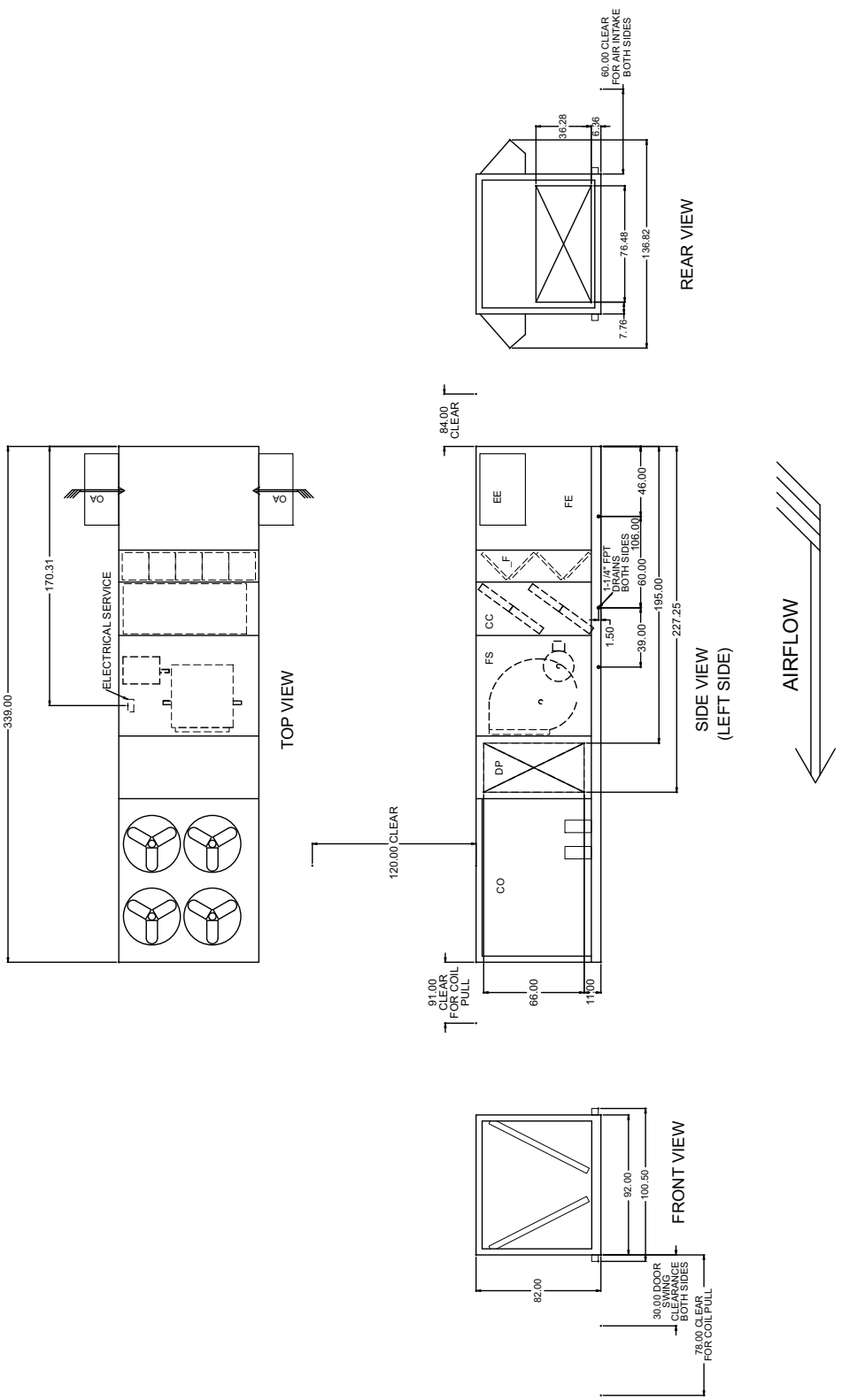
1. 10' Clearance Minimal Over The Top of the Condensing Unit.
2. Only One Adjacent Wall Can Exceed Unit Height.
3. 12' Clearance Required to Adjacent Units
4. 8' Service AccessRecommended on One Side.
5. Economizer and Exhaust Hoods, Where Applicable, are Folded Inside Unit for Shipment.

FIG. 3 – GENERAL ARRANGEMENT DRAWING

SIDE SUPPLY / REAR RETURN

SECTION DESCRIPTIONS:

EE = Economizer
FE = Fan Exhaust
_F = Filter Segments
CC = Cooling Coils
FS = Supply Fan
DP = Discharge Plenum
CO = Condenser Section



NOTES:

1. 10’ Clearance Minimal Over The Top of the Condensing Unit.
2. Only One Adjacent Wall Can Exceed Unit Height.
3. 12’ Clearance Required to Adjacent Units
4. 8’ Service AccessRecommended on One Side.
5. Economizer and Exhaust Hoods, Where Applicable, are Folded Inside Unit for Shipment.

FIG. 4 – GENERAL ARRANGEMENT DRAWING

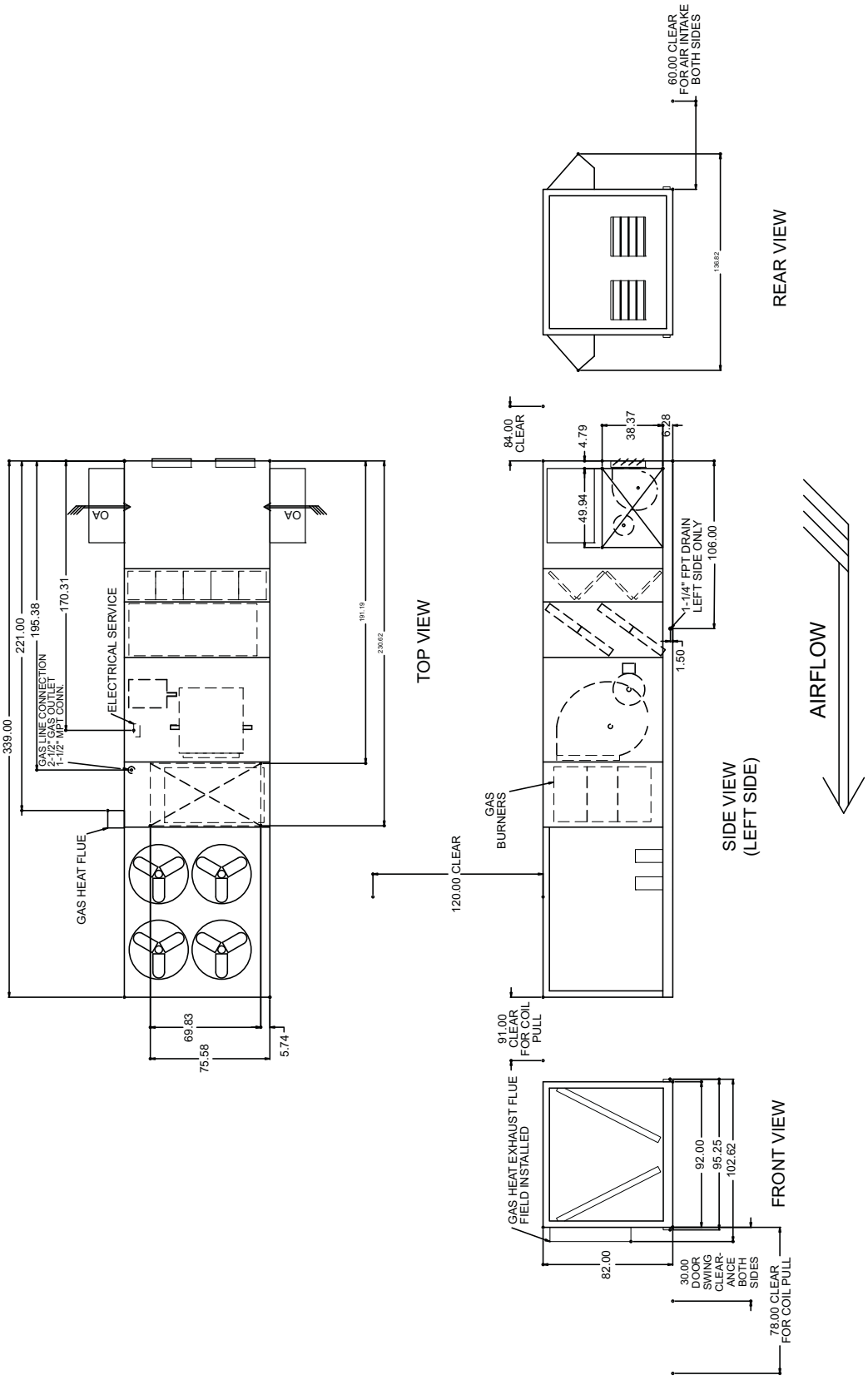
LD08296

General Arrangement Drawings

BOTTOM SUPPLY / SIDE RETURN

SECTION DESCRIPTIONS:

EE = Economizer
FE = Fan Exhaust
_F = Filter Segments
CC = Cooling Coils
FS = Supply Fan
DP = Discharge Plenum
CO = Condenser Section



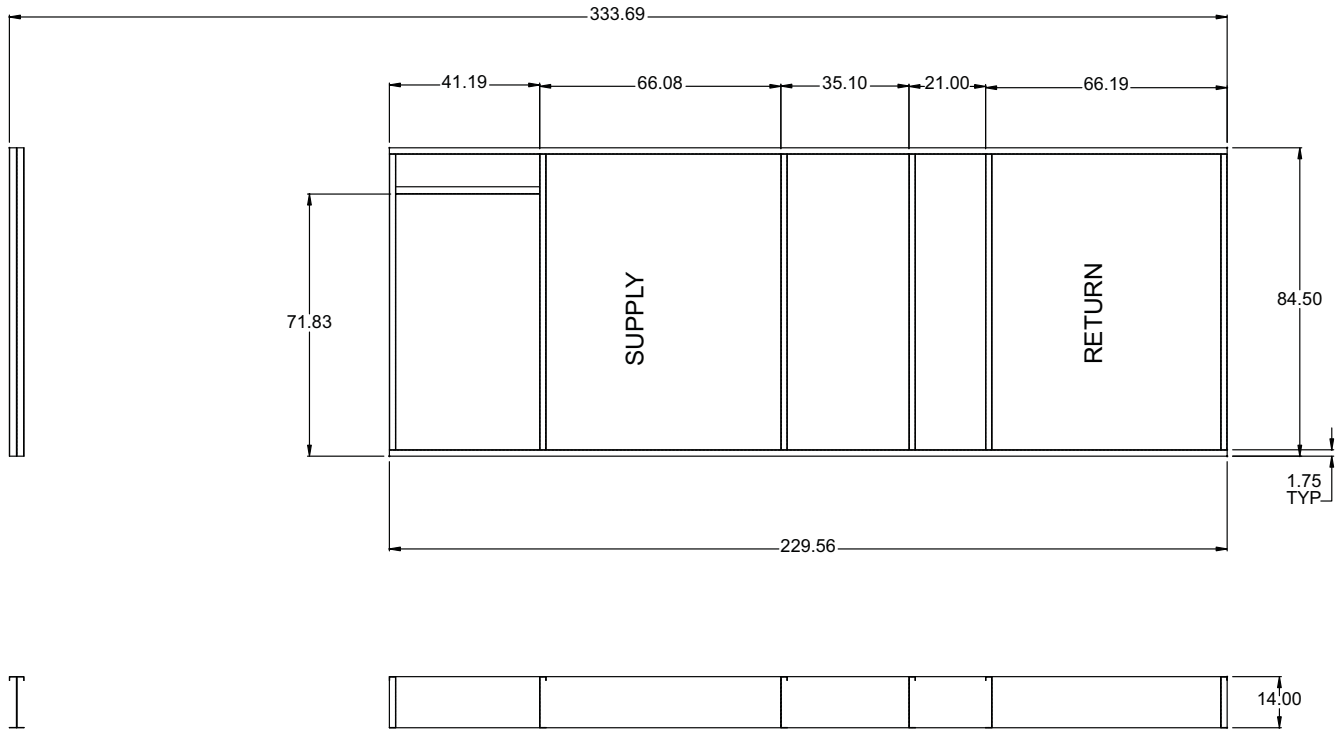
NOTES:

1. 10' Clearance Minimal Over The Top of the Condensing Unit.
2. Only One Adjacent Wall Can Exceed Unit Height.
3. 12' Clearance Required to Adjacent Units
4. 8' Service AccessRecommended on One Side.
5. Economizer and Exhaust Hoods, Where Applicable, are Folded Inside Unit for Shipment.

FIG. 5 – GENERAL ARRANGEMENT DRAWING

LD08370

CURB LAYOUT DRAWING



NOTES:

1. Unit must be installed square and level.
2. Curb configuration for “bottom” return and “bottom” supply.
3, These drawings are not intended as construction documents for the field-fabricated roof curbs. YORK will not be responsible for the unit fit-up, leak integrity, or sound level for installation using field-fabricated roof curbs.
4. The YPAL unit does not have a base pan under the condensing section of the unit. Field-fabricated roof curbs must have a cap on the top of the condensing section of the curb to prevent moisture from entering the space. The cap design must be sloped away from the supply-duct opening to the end of the unit for the drainage of the moisture off of the top of the cap.

FIG. 6 – GENERAL ARRANGEMENT DRAWING LD08297

Unit Weights

TABLE 23 – UNIT WEIGHTS

Model	050	051	060	061
Basic Unit*	7433	7433	7800	7819
Economizers				
No Outside Air	240	240	240	240
25% Outside Air Fixed Position Maual Damper	446	446	446	446
25% Outside Air 2 Position Actuated Damper	476	476	476	476
Full Modulation with Minimum Position	476	476	476	476
Power Exhausts				
Fan, Motor, Modulating Damper and Hood	501	501	501	501
Fan, Motor, VFD, Barometric Damper and Hood	506	506	506	506
Gas Heat				
375 MBH	162	162	162	162
750 MBH	324	324	324	324
1125 MBH (Bottom Discharge)	486	486	486	486
Options				
Open Perimeter Curb	544	544	544	544
Condenser Coil Wire Guard	64	64	64	64
Copper Evaporator Coils (additional)	312	312	416	416
Copper Condenser Coils (additional)	516	516	773	773
12” Rigid Filters (additional)	319	319	319	319

*Unit includes FC fan w/ 20 hp motor, VFD and 2” throwaway filters

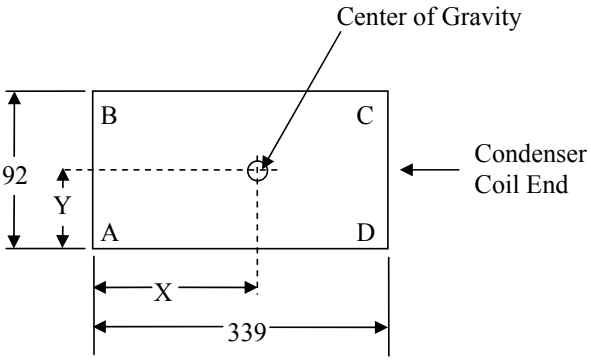


TABLE 24 – UNIT CENTER OF GRAVITY

Model	050		051	
	X	Y	X	Y
Basic Unit	184.1	50.2	184.1	50.2
Basic Unit w/ Econ.	191.0	49.9	191.0	49.9
Basic Unit w/ Econ. & Heating	187.4	50.0	187.4	50.0
Basic Unit w/ Econ. & Heating & Power Exhaust	194.9	49.5	194.9	49.5
Model	**060**		**061**	
	X	**Y**	**X**	**Y**
Basic Unit	179.8	49.9	179.6	50.0
Basic Unit w/ Econ.	186.7	49.7	186.5	49.7
Basic Unit w/ Econ. & Heating	183.5	49.8	183.2	49.8
Basic Unit w/ Econ. & Heating & Power Exhaust	190.9	49.3	190.7	49.3

TABLE 25 – UNIT CORNER WEIGHTS

Model	050				051			
	A	B	C	D	A	B	C	D
Basic Unit	1835	2201	1852	1545	1835	2201	1852	1545
Basic Unit w/ Econ.	2039	2417	1873	1580	2039	2417	1873	1580
Basic Unit w/ Econ. & Heating	2118	2521	2041	1715	2118	2521	2041	1715
Basic Unit w/ Econ. & Heating & Power Exhaust	2366	2751	2034	1750	2366	2751	2034	1750

Model	060				061			
	A	B	C	D	A	B	C	D
Basic Unit	1894	2244	1986	1676	1893	2250	1997	1680
Basic Unit w/ Econ.	2097	2461	2008	1711	2096	2466	2018	1715
Basic Unit w/ Econ. & Heating	2177	2565	2175	1846	2176	2570	2185	1850
Basic Unit w/ Econ. & Heating & Power Exhaust	2424	2795	2168	1881	2423	2801	2178	1885

Guide Specifications

GENERAL

Scope

The requirements of the General Conditions, Supplementary Conditions, Division 1 and drawings apply to all work herein.

Provide microprocessor-controlled, air-cooled, double-wall-construction, outdoor packaged rooftop air conditioning product of the scheduled capacities and performance as shown and indicated on the Drawings, including but not limited to:

1. Single-piece rooftop package
2. Charge of refrigerant and oil
3. Electrical power and control connections
4. Supply and return duct connections
5. Factory start-up

Quality Assurance

All units are tested, rated or certified, as applicable, in accordance with the following standards, guidelines and codes:

1. All units shall meet the latest ASHRAE 90.1 .2004 minimum energy-efficiency requirements (EER)
2. All units shall meet the latest ASHRAE 62 requirements for ventilation and indoor air quality.
3. All units shall be rated in accordance with the ARI Standard 340/360
4. All units shall be tested to ANSI/UL 1995 and CAN/CSA C22.2 No. 236 standards
5. Gas heating units shall be designed in conform to ANSI Z21.47-1998/CSA 2.3-M98 standards and be carry the UL listing
6. Units shall be ETL and ETL Canada listed

Manufacturers: The design shown on the drawing is based upon products of the manufacturer scheduled. Alternate equipment manufacturers shall be acceptable if equipment meets the scheduled performance and complies with these specifications. If equipment manufactured by manufacturer other than that scheduled is utilized, then the Mechanical Contractor shall be responsible for coordinating with the General Contractor and all affected Subcontractors to insure proper provisions for installation of the furnished unit. This coordination shall include, but not be limited to, the following:

1. Structural supports for units.
2. Roof curb transition.
3. Piping size and connection/header locations.
4. Electrical power requirements and wire/conduit and overcurrent protection sizes.
5. All costs incurred to modify the building provisions to accept the furnished units.

Warranty: Manufacturer shall warrant all equipment and material of its manufacture against defects in workmanship and material for a period of eighteen (18) months from date of shipment. Gas heat exchanger is 5 year.

1. The warranty shall include parts only during this period.
2. The warranty shall not include parts associated with routine maintenance, such as belts, air filters, etc.

Delivery and Handling

Unit shall be delivered to the job site fully assembled, wired, and charged with refrigerant and oil by the manufacturer. Unit shall be stored and handled per Manufacturer's instructions.

All handling and storage procedures shall be per manufacturer's recommendations.

Submittals

Shop Drawings: Shop drawing submittals shall include, but not limited to, the following: drawings indicating components, dimensions, weights, required clearances, and location, type and size of field connections, and power and control wiring connections.

Product Data: Product data shall include dimensions, weights, capacities, ratings, fan performance, motor electrical characteristics, and gauges and finishes of materials.

Documentation:

1. Fan curves with specified operating point clearly plotted shall be provided.
2. Product data of filter media, filter performance data, filter assembly, and filter frames shall be provided.
3. Electrical requirements for power supply wiring; including wiring diagrams for interlock and control wiring shall be supplied. Factory and field-installed wiring shall be clearly indicated.
4. Operation and maintenance documentation shall be supplied in accordance with Section 01830 – Operation and Maintenance, including but not limited to instructions for lubrication, filter replacement, compressor, motor and drive replacement, coil cleaning, filter maintenance, spare parts lists, and wiring diagrams.

Warranties

Equipment shall include the manufacturer's warranty not less than eighteen months from the date of shipment.

Extended parts warranty [optional] shall be included for an additional one [five] years

Extended parts and labor warranty [optional] shall be included for an additional one [five] years

EQUIPMENT

Product Specification

Summary: Completely factory assembled unitized construction packaged rooftop air conditioning unit including a factory-mounted and wired unit controller and sensors, single-point power connection 460V [208V/230V/ 575V] three-phase, 60Hz power supply, outdoor air handling section with return and supply openings, discharge plenum, direct-expansion refrigerant condensing section.

Factory Test: The refrigerant circuit shall be pressure-tested, evacuated and fully charged with refrigerant and oil. The completed refrigerant circuit shall undergo a factory helium leak test and undergo an automated operational run test and quality inspection prior to shipment. The unit controller shall be configured and run tested at the factory to minimize field setup time. Gas fired units are run tested. If the unit is not configured and tested, then the manufacturer shall provide field start up and testing to ensure that the controller is functioning properly.

Unit Construction:

Base Rail: The unit shall include an integral design base rail with lifting points clearly marked and visible on the base rail, and five (5) 1-1/4" FPT connections for condensate drainage. The unit base shall be designed with a recessed curb mounting location. The recessed curb mounting surface shall provide a continuous surface for field application of curb gasketing to create a weather tight seal between the curb and unit.

Casing: Casing shall be complete post and panel construction with exterior skin. All panels, doors, walls, uprights, floor panels and roofing shall be one-inch thick; 1-1/2 pound density insulation. Units are specifically designed for outdoor installation.

Roof: The unit roof shall be bowed with the peak in the middle of the unit and sloped to both sides of the unit for drainage. A drip lip shall run the length of the unit to prevent water drainage down the side of the unit. Roof and sidewall seams shall be continuously caulked and covered with formed galvanized seam caps. All panel fasteners shall be secured through standing seams to prevent fastener penetrations that are exposed to the air stream.

Paint: Exterior painted surfaces are designed to withstand a minimum of 1,000 salt spray hours when tested in accordance with ASTM B-117.

Markings and Diagrams: All necessary tags and decals to aid in the service and/or indicating caution areas shall be provided. Electrical wiring diagrams shall be attached to the control panel access door.

Documentation: Installation and operation maintenance manuals shall be supplied with each unit.

Access Doors: Double wall access doors shall be provided in the fan, coil, filter and inlet sections of the unit. Doors shall be double-wall construction with a solid liner and a minimum thickness of 1- inch. Doors shall be attached to the unit with piano-type stainless steel hinges. Latches shall be positive-action, creating an airtight seal between the door and unit. Panels and doors shall be completely gasketed with a closed-cell, neoprene gasket. Door tiebacks shall be provided for all doors to secure doors while servicing.

Economizer Section:

[SELECT NONE, OR ONE OF THE FOLLOWING]

1. No Outside-Air: the unit has no provisions for outside ventilation air.
1. Manual Outside-Air Damper: A manually adjustable outside-air damper capable of admitting 0-25% outside-air shall be provided.
1. Two-Position, Outside-Air Damper: A two-position, outside-air damper capable of admitting 0-25% outside-air shall be provided. The minimum position shall be manually adjustable from 0-25%. Control shall be based on the occupied mode of the unit. For occupied mode, the damper shall be open to the minimum position and for unoccupied, it shall be closed.
1. Modulating Economizer: The economizer segment shall be designed to use outside air for cooling and ventilation and provide a means of exhausting air from the air-handling unit. The segment shall consist of parallel-acting, low-leak dampers. The return-air, outside-air and exhaust-air dampers shall be sized for 100% of nominal unit airflow. The exhaust-air damper assembly shall have a factory-assembled rain hood. The rain hood shall have a drip-lip the full width of the hood to channel moisture away from the air being drawn into the unit.

[SELECT ONE OF THE FOLLOWING TYPES OF BUILDING PRESSURE CONTROL]

2. No Building Exhaust/Relief: The unit has no provisions to exhaust building return air.

Guide Specifications *(continued)*

2. Barometric Relief Damper: Building air exhaust shall be accomplished through barometric relief dampers installed in the return-air plenum. The dampers open relative to the building pressure. The opening pressure shall be adjustable.

2. On/Off, Fan-Powered Exhaust: A DWDI Class I or II forward-curved centrifugal exhaust fan shall be provided to exhaust building return air to relieve building static pressure. The fans shall be constant volume and operate based on either a building static pressure, or outside air-damper position.

2. Powered Exhaust with Modulating Discharge Damper: A DWDI Class I or II forward-curved centrifugal exhaust fan shall be provided to exhaust building return air to relieve building static pressure. The fans shall operate at a constant volume and operate based on building static pressure. Exhaust airflow shall be modulated via a parallel-acting, control damper. The exhaust-air dampers shall be sized for 100% of the exhaust airflow.

2. Powered Exhaust with Variable-Frequency-Drive: A twin DWDI Class I or II forward-curved centrifugal exhaust fan shall be provided to exhaust building return air to relieve building static pressure. Exhaust airflow shall be modulated via a factory-installed and commissioned variable-frequency-drive with the same nameplate horsepower as the supply fan motor.

[FOR POWERED-EXHAUST OPTIONS ABOVE, USE THE FOLLOWING]

3. Fan Motor: Fan motors shall be NEMA design ball-bearing types with electrical characteristics and horsepower as specified. Motors shall be 1750 RPM, ODP [TEFC] open drip-proof type. The motor shall be located within the unit on an adjustable base.

   Mountings: Fan and fan motor shall be internally mounted and isolated on a full width isolator support channel using 1-inch [2-inch] springs. The fan discharge shall be connected to the fan cabinet using a flexible connection to insure vibration-free operation.

   Bearings and Drives: Fan bearings shall be self-aligning, pillow block or flanged type regreaseable ball bearings and shall be designed for an average life (L50) of at least 200,000 hours. All bearings shall be factory lubricated and equipped with standard hydraulic grease fittings and lube lines extended to the motor side of the fan. Fan drives shall be selected for a 1.5 service factor and antistatic belts shall be furnished. All drives shall be fixed pitch. Fan shafts shall be selected to operate well below the first critical speed and each shaft shall be factory coated after assembly with an anticorrosion coating.

Filter Section:

[SELECT A FILTER RACK, FILTER MEDIA, AND SWITCH IF DESIRED]

1. Angled Filter Rack: two-inch throwaway filters shall be provided in an angled filter rack.
1. Angled Filter Rack: two-inch carbon media filters shall be provided in an angled filter rack.
1. Angled Filter Rack: two-inch cleanable filters shall be provided in an angled filter rack.
1. Angled Filter Rack: two-inch high-efficiency (30%) pleated filters shall be provided in an angled filter rack.
1. Flat Filter Rack: 60-65% efficient rigid filters with a two-inch, high-efficiency pleated pre-filters shall be provided in a flat filter rack.
1. Flat Filter Rack: 90-95% efficient rigid filters with a two-inch, high-efficiency pleated pre-filters shall be provided in a flat filter rack.
2. Dirty Filter Alarm: A dirty-filter switch shall be provided and wired to the rooftop unit control panel. Upon closure of the switch, the controller shall display a dirty-filter fault. The setting of the switch can be changed manually to close at a specified pressure drop across the filters.

Evaporator Section

1. Cooling Coil: Evaporator coils shall be direct-expansion type with intertwined circuiting to assure complete coil-face activity during part-load operation. Coil tubes shall be 3/8” OD copper, with internally enhanced tubes. Fins shall be enhanced mechanically expanded to bond with the copper tubes. Coil casing shall be fabricated from heavy-gauge galvanized steel. All coils shall be pressure tested at a minimum of 450 PSIG.
2. IAQ Drain Pan: The main coil drain pan shall be double-sloped with a condensate connection through the base rail of the unit. Clearance between the evaporator coil and the drain pan shall allow for easy access to the drain pan for cleaning, and shall be visible for inspection without the removal of components.
3. Intermediate Drain Pan: Coils with finned height greater than 48” shall have an intermediate drain pan extending the entire finned length of the coil.

The intermediate pans shall have drop tubes to guide condensate to the main drain pan.

Supply Fan Section

1. Fan: The fan section shall be equipped with a single double-width, double-inlet (DWDI), forward-curved [airfoil optional] centrifugal type wheel for horizontal discharge. An access door shall be provided on both sides of the unit for fan/motor access.
2. Fan Motor: Fan motors shall be NEMA design ball-bearing types with electrical characteristics and horsepower as specified. Motors shall be 1750 RPM, open drip-proof type [TEFC optional]. The motor shall be located within the unit on an adjustable base.

   Mountings: Fan and fan motor shall be internally mounted and isolated on a full-width, isolator-support channel using 1-inch [2-inch] springs. The fan discharge shall be connected to the fan cabinet using a flexible connection to insure vibration-free operation.

   Bearings and Drives: Fan bearings shall be self-aligning, pillow block or flanged type regreaseable ball bearings and shall be designed for an average life (L50) of at least 200,000 hours. All bearings shall be factory lubricated and equipped with standard hydraulic grease fittings and lube lines extended to the motor side of the fan. Fan drives shall be selected for a 1.5 service factor and antistatic belts shall be furnished. All drives shall be fixed pitch. Fan shafts shall be selected to operate well below the first critical speed and each shaft shall be factory coated after assembly with an anticorrosion coating.
3. VAV Fan Control: VAV supply fan control shall be accomplished by using a variable-frequency drive matched to the supply-fan motor HP. The VFD shall include an integral DC line reactor to reduce harmonic distortion in the incoming and outgoing power feeds. If a DC line reactor is not provided, an AC line reactor must be provided. Inlet guide vanes shall not be acceptable. VFD control keypads shall be located in the control cabinet for accessibility and servicing while the unit is operating.
4. Optional VFD manual bypass: a three-contactor manual bypass shall be provided to permit replacement of the VFD in the event of a power failure.

Discharge Plenum

[SELECT ONE OF THE FOLLOWING HEAT/NO HEAT CONFIGURATIONS]

1. Cooling Only: The discharge-air-temperature sensor shall be located in the discharge plenum and be located such that it accurately measures the supply-air temperature. Walls shall be lined with a solid liner to prevent erosion of the insulation and to separate insulation from the air stream.

1. Staged Gas Heat: The heating section shall include an induced-draft furnace with two stages [four stages or six stages] of heating capacity.

   Heat Exchanger: The heat exchanger shall be constructed of tubular aluminized steel [stainless steel], with stainless steel flue baffles and flue assembly.

   Burner and Ignition Control: The burner shall include a direct-driven induced-draft combustion fan with energy efficient intermittent direct spark ignition, redundant main gas valves with pressure regulator.

   Combustion-Air Fan: The inducer fan(s) shall maintain a positive flow of air through each tube, to expel the flue gas and to maintain a negative pressure within the heat exchanger relative to the conditioned space.

   Safety Devices: A high-limit controller with automatic reset to prevent the heat exchanger from operating at an excessive temperature shall be included. An air-proving switch shall prevent ignition until sufficient airflow is established through the heat exchanger. A rollout switch shall provide secondary airflow-safety protection. The rollout switch shall discontinue furnace operation if the flue becomes restricted.

   Flue: The furnace flue shall be shipped loose to protect it from damage during transit. The flue shall be field-mounted by the installing contractor. The flue outlet shall be located above the unit to help prevent recycling of combustion gases back through the heat exchanger. Agency Certification: Gas heating sections are both ETC/CETL approved to both US and Canadian safety standards.

1. Heat Exchanger(s): The heat exchanger(s) shall be constructed of tubular aluminized steel [stainless steel], with stainless steel flue baffles and flue assembly.

Condenser Section

1. Condenser Fans: Condenser fans shall be matched up with compressors to optimize system control. Condenser fans shall be propeller-type, directly driven by permanently lubricated TEAO motor.
2. Condenser Coil: Condenser coils shall be seamless copper tubes, arranged in staggered rows,

Guide Specifications *(continued)*

mechanically expanded into the end sheets. Coils are configured in a V-bank configuration, with individual flat coils rotated from the vertical plane for protection from hail damage for each condensing circuit. Condensing coils shall have a subcooler for more efficient, stable operation.

3. Compressors: Units shall use industrial-duty hermetic scroll compressors, piped and charged with oil and R-410A refrigerant. Compressors shall have an enlarged, liquid-carrying capacity to withstand rugged operating conditions. Compressor frame shall be cast iron, with cast-iron fixed and orbiting scrolls. Each compressor shall feature a line break, designed to protect the compressor from over-temperature and over-current conditions. Compressors shall be vibration-isolated from the unit, and installed in an easily accessible area of the unit. All compressor-to-pipe connections shall be brazed to minimize potential for leaks. Each compressor shall include an oil sight glass.
4. Low Ambient: Compressors shall operate down to 0°F Control [optional] by monitoring the refrigeration system discharge pressure and adjusting condenser airflow to maintain the proper head pressure to protect compressor operation.
5. In-Line Refrigerant Driers: Refrigerant piping includes thermal-expansion valves with replaceable thermostatic elements, high- and low-pressure switches, anti-recycling timing device to prevent compressor restart for five minutes after shutdown.
6. Freezestat: Freezestats shall be provided to prevent coil freeze-up and reduce the risk of liquid floodback to the compressor.
7. Condenser Wire Grill [optional]: The condenser section shall be enclosed by a wire grill condenser enclosure on the three exposed sides. Plastic finish shall match the color and salt-spray specifications of the unit exterior.
8. Hot-Gas Bypass [optional on constant-volume units]: Hot-gas-bypass piping shall be provided to enable compressor unloading to as low as 5% to better match cooling demand at low loads, prevent excessive cycling of the compressor, and reduce the risk of coil freeze-up.
9. Compressor-sound treatment [optional]: Compressor sound blankets shall be provided to attenuate radiated sound from the compressors.
10. Service Valves [optional]: Liquid, suction and discharge service valves shall be included to provide a means of isolating the refrigerant charge in the system so that the refrigeration system may be serviced without removing the charge of the unit.

Controls (Simplicity Elite)

1. Enclosure: Unit shall be shipped complete with factory-configured, installed, wired and tested rooftop unit controller housed in a rain-and-dust-tight enclosure with hinged, latched, and gasket sealed door.
2. Basic Controls: Control shall include automatic start, stop, operating, and protection sequences across the range of scheduled conditions and transients. The rooftop unit controller shall provide automatic control of compressor start/stop, energy-saver-delay and anti-recycle timers, condenser fans, and unit alarms. Automatic reset to normal operation after power failure. Software stored in nonvolatile memory, with programmed setpoints retained in lithium battery backed real time clock (RTC) memory for minimum 5 years.
3. Diagnostics: Upon demand, the controller shall run through a self-diagnostic check to verify proper operation and sequence loading. The rooftop unit controller shall continually monitor all input and output points on the controller and to maintain proper operation. The unit shall continue to operate in a trouble mode or shut down as necessary to prevent an unsafe condition for the building occupants, or to prevent damage to the equipment. In the event of a unit shutdown or alarm, the operating conditions, date and time shall be stored in the shutdown history to facilitate service and troubleshooting.
4. Controls and BAS Communications

   (RS-485) Modbus: The unit shall include Modbus communications directly from the unit controller. Equipment that is not native to the unit.

   A field installed Modlinc Gateway device is required by the manufacturer to communicate to BACnet (MSTP), A control points list shall be provided by the manufacturer to facilitate communications programming with the building automation system. Programming, establishing communications and commissioning shall be the responsibility of the installing controls contractor. Start-up assistance and support may be purchased from the manufacturer.

   Analog inputs: 0-10VDC inputs shall be provided for remote reset of supply air temperature, and duct static pressure

   Binary outputs: Dry (or “wet”) contacts shall be provided for alarm outputs for supply fan fault, cooling/heating fault, or general/sensor faults. Contacts shall also be provided for occupied/unoccupied, shutdown, smoke purge, exhaust or pressurization operations; call for cooling or heating.

EXECUTION

Installation

General: Installing contractor shall install rooftop unit(s), including components and controls required for operation, in accordance with rooftop unit manufacturer's written instructions and recommendations. Rooftop units shall be installed as specified.

1. Unit(s) specified shall include a protective covering membrane for such equipment being shipped by truck, rail, or ship. The membrane is fully formed around the equipment exterior. The membrane covers the entire top, side and end panel surface as to protect the product effectively during shipping & storage including "Long Term Storage". Storing on jobsite shall no longer require the unit(s) to be covered with a tarp as long as the covering membrane has not been removed.
2. All size or shape equipment including electrical components, especially those not built with weatherproof enclosures, variable-frequency drives and end devices shall be effectively covered for protection against rain, snow, wind, dirt, sun fading, road salt/ chemicals, rust, and corrosion during shipping cycle. Equipment shall remain clean and dry.
3. Manufacturers of units not having a protective membrane, fully formed around the equipment exterior, covering the entire top, side and end panel surface area shall be required to ship equipment covered with a tarp, in crating or in a closed truck as is necessary to ensure product protection from road salt/ chemicals damage, moisture and dirt infiltration. Arrangements for long term storage at the job site shall be required.

Location: Locate the rooftop unit as indicated on drawings, including cleaning and service maintenance clearance per Manufacturer instructions. Adjust and level the rooftop unit on support structure.

INSPECTION AND START-UP SUPERVISION

A factory-trained service representative of the manufacturer shall supervise the unit startup and application specific calibration of control components.

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